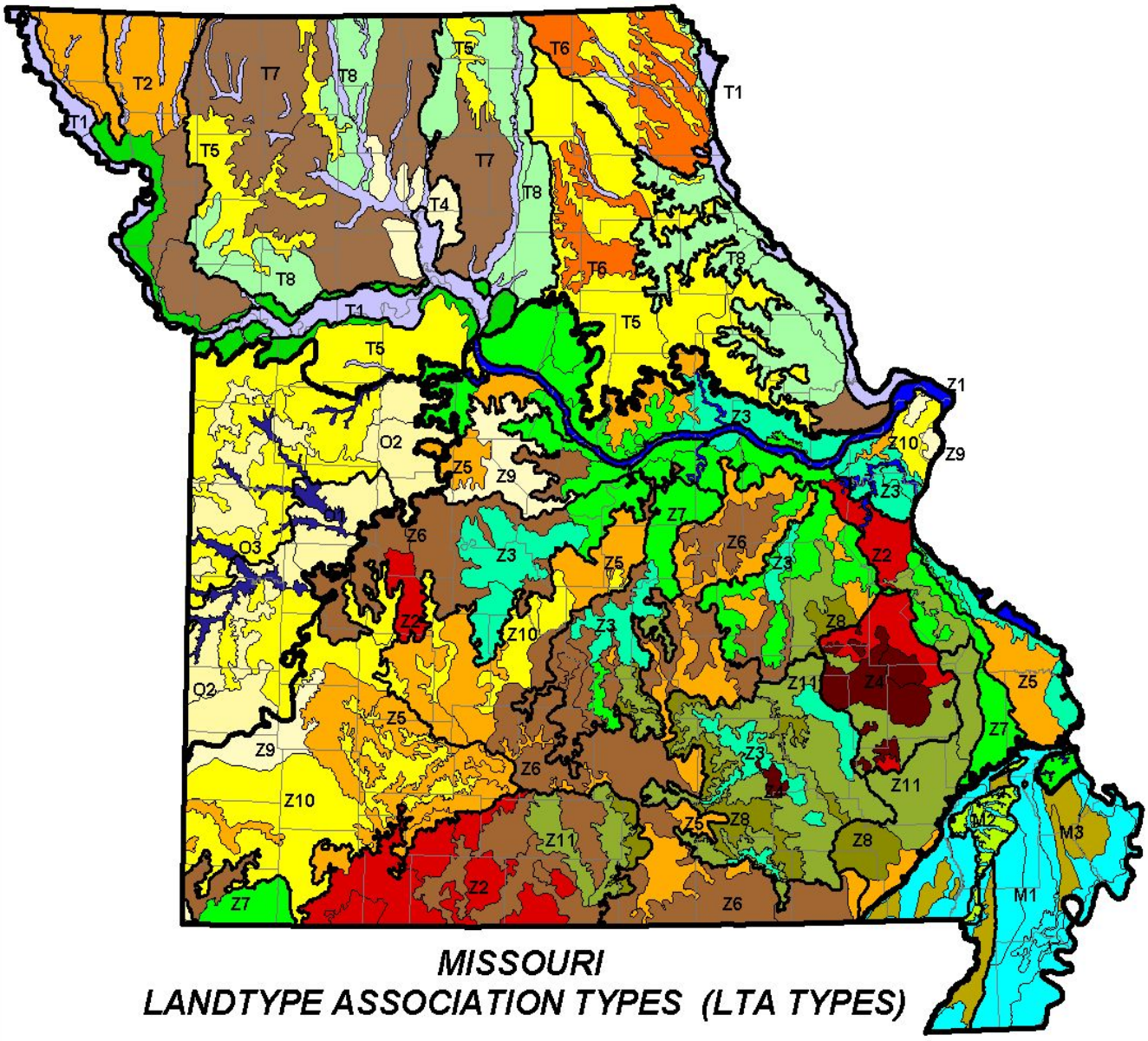
SETTING BROAD, ECOLOGICALLY BASED GUIDANDCE USING LANDTYPE ASSOCIATIONS

Forest Land Management Guidelines for the Missouri Department of Conservation will take a two-tiered approach. Broad regional management direction will be set using Landtype Associations (LTAs) as a framework. These regional management strategies will serve to continually update Regional Priorities. This will help MDC identify ***what*** resources will be emphasized ***where***.

A Land Management Technical Guide will be developed to address specific techniques for forest and woodland natural communities. They are meant to be the ***how*** part of the guidelines.

The 25 LTA Types described in this document are ecological landscapes that have an inherent ability to support different resource management outcomes at landscape and local scales. They will be used to develop broad, strategic direction for the management of landscapes, communities, habitats and species, as well as to provide an appropriate variety of recreation, education and resource commodity outputs. A map and brief descriptions of the LTA Types in Missouri is followed by profiles of each type. The profiles include an initial set of resource management issues and opportunities developed by the Forest Land Management Guides committee. They also contain a list of conservation targets at the landscape, community and species levels that was developed during the Missouri CWS process. All of these can be added to and used to identify regional management priorities by LTA Type.



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LANDTYPE ASSOCIATION TYPES (LTA TYPES)

Central Dissected Till Plains Section

- T1 TP Alluvial Plains (Pg 5)
- T2 TP Loess Prairie Hills and Blufflands (Pg 7)
- T3 TP Loess Woodland/Forest Breaks (Pg 9)
- T4 TP Low Prairie Plains (Pg 11)
- T5 TP Prairie Plains (Pg 13)
- T6 TP Prairie/Woodland Dissected Plains (Pg 15)
- T7 TP Prairie/Woodland Hills (Pg 17)
- T8 TP Woodland/Forest Hills (Pg 19)

Osage Plains Section

- O1 OP Alluvial Plains (Pg 21)
- O2 OP Prairie Plains (Pg 23)
- O3 OP Prairie/Savanna Scarped& Dissected Plains (P 25)

Ozark Highlands Section

- Z1 OZ Alluvial Plains (Pg 27)
- Z2 OZ Dolomite Glade/Woodlands (PG 29)
- Z3 OZ Forested Rugged Hills and Breaks (Pg 31)
- Z4 OZ Igneous Knobs (pg 33)
- Z5 OZ Oak Savanna/Woodland (Dissected) Plains(35)
- Z6 OZ Oak Woodland Dissected Plains & Hills(Pg 37)
- Z7 OZ Oak Woodland/Forest Hills (Pg 39)
- Z8 OZ Pine-Oak Woodland Dissected Plain (Pg 41)
- Z9 OZ Prairie Plains (Pg 43)
- Z10 OZ Prairie/Savanna (Dissected) Plains (Pg 43)
- Z11 Oz Oak-Pine Woodland/Forest Hills (Pg 45)

Mississippi Alluvial Basin Section

- M1 MB Alluvial Plains (Pg 47)
- M2 MB Crowley's Ridge Hills (Pg 49)
- M3 MB Sand Ridges, Plains & Hills (Pg 51)

LANDTYPE ASSOCIATION TYPES

Landtype Associations (LTAs) are ecological landscapes 10-100s of square miles in size that recognize local characteristics in topography, geology, soils and natural vegetation. They are an effective unit in the Ecological Classification System (ECS) Hierarchy for identifying and setting resource management goals at a landscape scale. Ecological Sections, Subsections and Landtype Associations for Missouri are described in the Atlas of Missouri Ecoregions, available from the Missouri Department of Conservation in Jefferson City.

Missouri LTAs have been mapped by the Missouri ECS project for the entire state of Missouri. Over 300 LTAs have been mapped and grouped into 25 similar landscapes or LTA Types within each of the four ecological sections. LTAs within a type represent very similar landscape ecosystems and therefore would have similar resource potential. Brief descriptions of the LTA Types are followed by more detailed profiles that list resource management issues and opportunities, and provide a list of conservation targets within each type.

Dissected Till and Loess Plains Section (TP)

T1 TP Alluvial Plains (Pg 5). Low, flat alluvial plains along the major streams of the section. Had to be at least 1 mile wide to be recognized. Historically a mosaic of marshes, wet prairie and bottomland forest. Today, over 95% cropland, with substantial wetland and bottomland forest restoration opportunities.

T2 TP Loess Prairie Hills and Blufflands (Pg 7). Very steep to moderately rolling landscapes mantled in 10 to over 100 feet of loess. Confined to northwestern Missouri. Historically over 80% prairie, including unique dry loess hill prairies. Largely cropland today; some substantial prairie restoration opportunities exist.

T3 TP Loess Woodland/Forest Breaks (Pg 9). Very steep and dissected hills lining river valleys, especially along the Missouri River. Often covered in deep loess with frequent mesic coves. The most timbered landscapes in historic north Missouri. Opportunities for large, diverse forest patches.

T4 TP Low Prairie Plains (Pg 11). Low, flat plains elevated above the current alluvial plain; confined to the lower Grand River Region. Seasonally wet; historically dominated by a mosaic of lowland and upland prairie. A mixture of crop and grass today, unique lowland prairie and wetland restoration opportunities.

T5 TP Prairie Plains (Pg 13). High, flat divides that were historically over 90% prairie. Strongly cropland today, but offers opportunities for large, open and grassland landscapes.

T6 TP Prairie/Woodland Dissected Plains (Pg 15). Flat to gently rolling uplands with up to 150 feet of local relief. Confined to shallow valleys in northeastern Missouri. Historically prairie in the higher exposed landscape positions and oak savanna and woodland on lower protected sites. Much cropland and grassland today; good opportunities for large grassland and savanna/woodland habitats.

T7 TP Prairie/Woodland Hills (Pg 17). Gently to strongly rolling landscapes in loess and glacial till. Local relief 100-250 feet. More dissected and historically timbered than Prairie/Savanna Dissected Plains. Historically, a complex mosaic of large patches of prairie, savanna and forest. Opportunities for large, intercolating prairies, savannas and woodlands.

T8 TP Woodland/Forest Hills (Pg 19). Strongly rolling hills mainly in glacial till and sedimentary residuum; associated with stream valleys throughout the region. Historically, narrow ridgetop prairies and savannas, gave way to woodland and forest slopes. This landscape lends itself to complex mosaics of open to closed, timbered natural communities.

Osage Plains Section (OP)

O1 OP Alluvial Plains (Pg 21). Large, at least 1 mile wide alluvial plains, mainly in the upper Osage River Basin. Historically, extremely variable wetland complexes of marshes, wet prairie and bottomland timber. Many wetland restoration opportunities.

02 OP Prairie Plains (pg 23). Very flat upland and lowland plains historically dominated by prairie. Unique hardpan prairies included. Primarily cropland and fescue pasture.

03 OP Prairie/Savanna Scarped and Dissected Plains (Pg 25). Flat to moderately rolling landscapes associated with limestone scarps in the northern Osage Plains and valleys in the Cherokee Plains. Historically, dominated by prairie in the higher, flatter uplands and savannas in the lower, steeper areas. Today, existing native vegetation in the region is largely associated with these landscapes; including numerous prairie remnants and dense oak woodland with restoration potential.

Ozark Highlands Section (OZ)

Z1 OZ Alluvial Plains (Pg 27). Confined to the broad alluvial plains of the Missouri River and lower tributary reaches within the Ozarks. At least 1 mile wide alluvial plains with a variety of alluvial substrates, but often sandy or loamy materials. Historically dominated by riverfront bottomland forest types; today, principally cropland.

Z2 OZ Dolomite Glade/Woodland LTAs (Pg 29). A variety of landscapes all of which have a prominent component of shallow soiled glade and oak woodland communities. Includes only dolomitic landscapes, the igneous knobs having there own LTA Type. Historically, glade/woodland complexes were common and interspersed within an otherwise forested landscape. Today, many of the glade/woodland complexes are overgrown in the absence of fire, but show excellent restoration potential.

Z3 OZ Forested Rugged Hills and Breaks (Pg 31). The exceptionally steep and rugged lands associated with many river valleys. Local relief 250 to 450 feet, with narrow ridges, steep sideslopes and narrow, sinuous valleys. Historically the most densely timbered landscapes in the region. Today, still largely timbered with high habitat diversity including numerous forest types, glades, fens, cliffs, caves, springs and outstanding streams.

Z4 OZ Igneous Knobs (Pg 33). The only igneous landscapes in Missouri, associated with the rugged and prominent knobs of the St. Francis Mountains and a cluster of knobs in the center of the Current River valley. Knob tops often encircled by glade/woodland complexes, while sideslopes well forested in oak-pine and mixed oak forest; valleys have frequent shut-ins. These LTAs are minimally developed and are often wild. Opportunities for glade/savanna restoration and dispersed, wildland recreation.

Z5 OZ Oak Savanna/Woodland (Dissected) Plains (pg 35). High, flat to minimally dissected drainage divides with less than 100 feet of local relief or shallow valleys in the western Ozarks.

Historically, a mosaic of small prairies, oak savannas and open oak woodlands. Today they are dominated by fescue pasture and dense, isolated woodlots. Best opportunities for grassland and savanna dominated landscape in the interior Ozarks.

Z6 OZ Oak Woodland Dissected Plains and Hills (pg 37). The flat to moderately rolling drainage divides with up to 150 feet of local relief and hillier lands in the upper Osage and Gasconade River basins. Historically, post oak and mixed oak woodland, with dense timber in deepest valleys. Today a near even mix of fescue pasture and dense second growth oak woodland. Offers substantial opportunities for managing large woodlands or a grassland-woodland mosaic.

Z7 OZ Oak Woodland/Forest Hills (Pg 39). The hilly lands associated with most stream valleys outside of the range of shortleaf pine in the Ozarks. Not as steep as the Breaks, but with up to 250 feet of local relief. Broad ridges give way to moderately steep sideslopes and relatively broad valleys. Historically, timbered in oak woodland high in the landscape and mixed oak forest lower. Today mainly second growth mixed oak forest and occasional glades.

Z8 OZ Pine-Oak Woodland Dissected Plains (Pg 41). Flat to moderately rolling divides in the southeastern Ozarks where associated with the Roubidoux formation. Historically, nearly continuous pine and pine-oak woodland. Today, dominated by dense second growth oak and oak-pine forest with diminished pine and ground flora. Sinkhole ponds common. Outstanding opportunities for pine woodland restoration exist.

Z9 OZ Prairie Plains (Pg 43). Confined to two smooth plains, on the edge of the Springfield Plateau and the divide between the middle Osage and Missouri Rivers where prairie was once the dominant cover. Today mainly cropland and fescue pasture. Best open and grassland landscape opportunity within the Ozarks, but there is little public land.

Z10 OZ Prairie/Savanna (Dissected) Plains (Pg 43). High, flat to minimally dissected drainage divides with less than 100 feet of local relief. Mainly in western Ozarks where prairie was more prevalent, but also on the highest, flattest landscapes in the eastern Ozarks. Historically, prairie dominated highest, flattest areas and graded into post oak barrens and savanna. Today, they are largely fescue pasture with small, isolated woodlots. Substantial opportunity for grassland and savanna management exists, but there is little public land.

Z11 OZ Oak-Pine Woodland/Forest Hills (Pg 45). The hilly lands associated with stream valleys within the range of shortleaf pine in the southeastern Ozarks . Not as steep as the Breaks, but with up to 250 feet of local relief. Broad ridges give way to moderately steep sideslopes and relatively broad valleys. Historically and currently timbered in oak-pine and mixed oak woodland and forest, with scattered glades and fens. Good opportunity to manage for large patches of forest with a variety of woodland and forest communities.

Mississippi Alluvial Basin Section (MB)

M1 MB Alluvial Plains (Pg 47). The dominant landscape in this region. Flat alluvial plains dominated historically by swamps, bottomland forest, marsh and occasional prairie communities. Today nearly all cleared and drained for row crop agriculture. A few isolated remnants exist, many in conservation ownership.

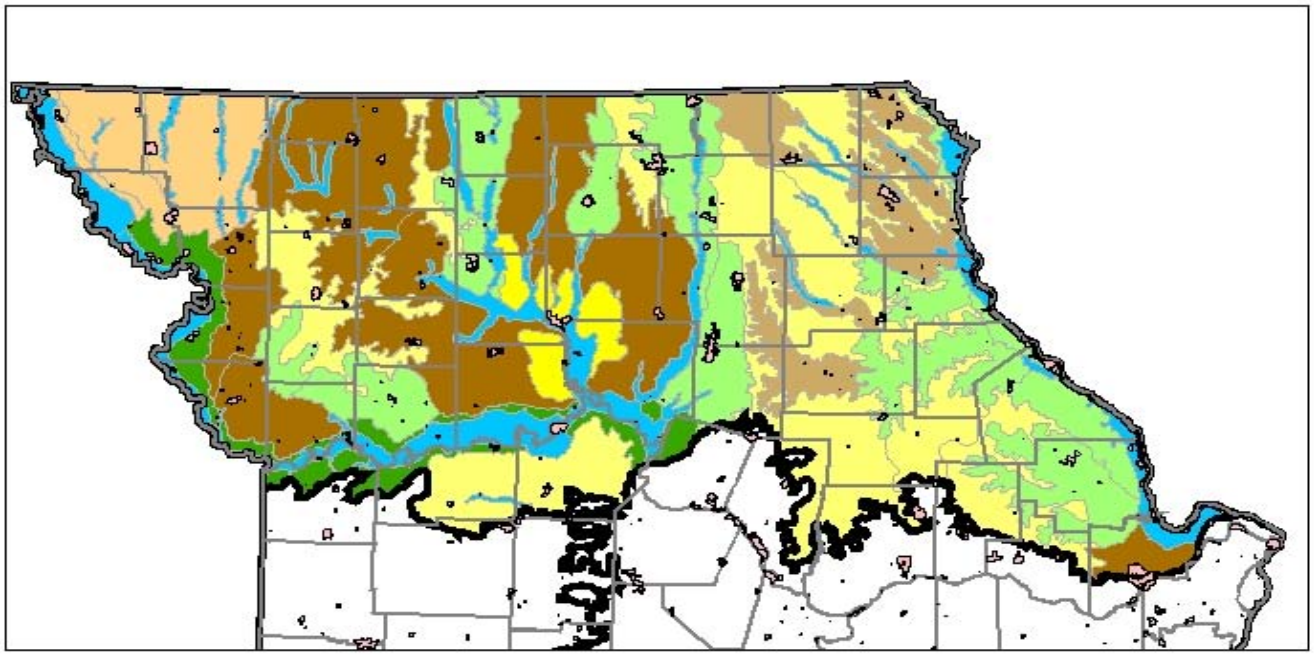
M2 MB Sand Ridges, Plains and Hills (Pg 49). Slightly elevated terraces and former alluvial fans with loamy and sandy substrates, often excessively drained. Historically, prairie and

savanna dominated with numerous unique species. Today only a very few small remnants remain.

M3 MB Crowleys Ridge (Pg 51). An elevated remnant of former floodplain with a mixture of sand, gravel, silt and bedrock substrates. Historically timbered in a variety of woodland and forest. Today partially timbered with frequent pasture. Unique forest and seep communities are worthy of conservation.

CENTRAL DISSECTED TILL PLAINS SECTION

The Central Dissected Till Plains Section is characterized by moderately dissected glaciated plains that slope regionally toward the Missouri and Mississippi Rivers. The section covers almost all of Missouri north of the Missouri River and extends into southern Iowa and small portions of Kansas and Nebraska. In Missouri, the ecoregion is blanketed with Pleistocene loess over glacial till that varies in thickness from complete absence in peripheral regions to over three hundred feet thick in northern Missouri. The till was
deposited by Pre-Illinoisan ice sheets over four hundred thousand years ago. Subsequent loess deposition, fluvial processes, and long-term weathering of surface materials make this region in many respects less a glacial landscape than a fluvial landscape. Except for the till, few recognizable glacial features remain.



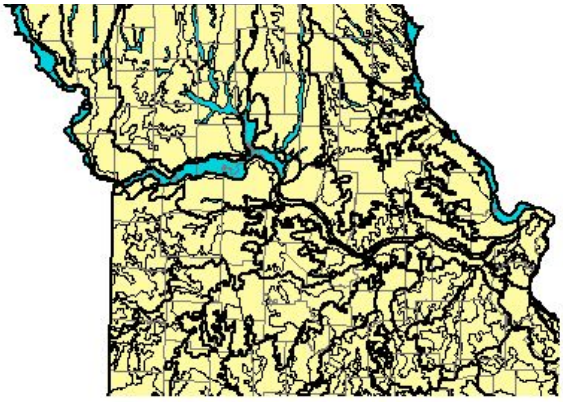
Central Dissected Till Plains LTA Types and MDC Lands

- TP Alluvial Plains
- TP Loess Prairie Hills and Blufflands
- TP Low Prairie Plains
- TP Prairie Plains
- TP Prairie/Woodland Dissected Plains
- TP Prairie/Woodland Hills
- TP Woodland/Forest Breaks
- TP Woodland/Forest Hills

Millennia of fluvial erosion, transport, deposition, and pedologic processes have created a diversity of landforms that vary in degree of relief, dissection, and geologic parent materials and complex patterns of soil and natural vegetation. Smooth plains and broad ridges occupy areas distant from major drainages. They tend to have very deep, dark mollisols derived from loess under native prairie and claypan soils on the flattest uplands. Rolling hills with gentle slopes, closer to drainages, have a mixture of loess and till-derived soils, with prairie soils higher in the landscape and transitional savanna or woodland soils (thin mollic surface over an alfisol) on the sideslopes. More highly dissected lands, with narrow ridges and deep valleys, occur near the major drainages, especially the Missouri and Mississippi Rivers. In these places the ridgetops may carry deep loess caps, but residual soils from sedimentary bedrock occur on the steep sideslopes. These areas have transitional soils high in the landscape and true forest soils low in the landscape. The major tributaries to the Missouri and Mississippi Rivers, especially the Grand and Chariton Rivers, occupy exceptionally broad and flat valleys. Most of these channels have been straightened by channelization. Bottomland soils vary from well-drained forest soils to poorly drained wetland soils. In general, the rather complete dissection of the Central Dissected Till Plains has resulted in an intricate mosaic of uplands, sideslopes, and bottomlands, with an equally complex pattern of potential prairie, woodland, and forest ecosystems.

Differences in landform, geology (including till and loess), soils, and vegetation produce eight Landtype Association Types in Missouri. While Prairie Plains landscapes have little forest or woodland resource potential, the other landscapes do.

TILL PLAINS ALLUVIAL PLAINS LTAs



CHARACTERISTICS: Confined to the broad alluvial plains of the Missouri, Mississippi, Grand and Chariton rivers, and tributaries with broad (≥1 mile wide) floodplains within the Till Plains. These reaches on the big rivers are broad and low gradient. Streams possess mainly sand bed channels, and well-developed floodplains with a wide variety of alluvial substrates. Historically, this LTA type was dominated by a mosaic of marshes, wet prairie and bottomland forest, and rivers contained more meanders, side channels, islands and wetlands. Today, the rivers are largely channelized and their floodplains cleared for cropland. Many sandbars, plus some wetlands and bottomland forests, remain.

MANAGEMENT ISSUES AND OPPORTUNITIES:

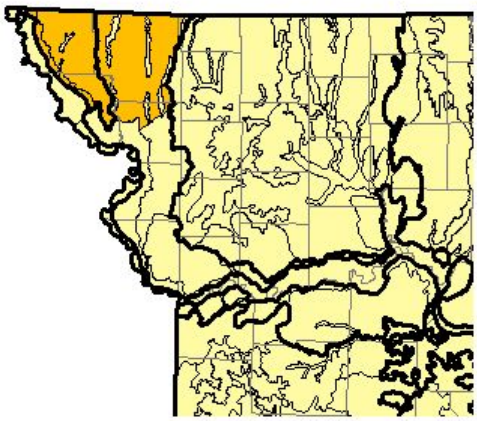
- Size: almost 1.7 million acres. Conservation lands comprise over 125,000 acres, or 7% of the area. Most conservation lands are owned by MDC, but USFWS owns over 27,000 acres and several state parks encompass over 5,000 acres. Prominent conservation lands include Nodaway Valley, Fountain Grove, Rebel's Cove, Upper Mississippi, and Ted Shanks Conservation Areas (MDC); Big Lake, Pershing, Battle of Athens and Wakonda State Parks (DNR); Squaw Creek, Swan Lake, Big Muddy and Clarence Cannon National Wildlife Refuges (USFWS); and Sandy Island Bald Eagle Sanctuary (TNC).
- The dynamic nature of the river ecosystems has been largely controlled for navigation and agriculture. However, recent acquisition of flood-damaged land has increased the opportunity to return parts of the floodplains to the rivers. Water management from upstream reservoirs is an influential issue. Streams are degraded by channelization, riparian corridor clearing, sedimentation, storm water, sewage and agricultural runoff. Urbanization of the floodplain is also a significant impact.
- Large alluvial plains in the Till Plains ecological section historically supported extensive bottomland prairie and marsh communities that are very rare today. WRP and USACOE mitigation has positively impacted the number and quality of wetland acres in the alluvial plains. Private duck clubs are also an important factor.
- Reforestation will not only provide more acres of valuable bottomland forest habitat, but can also help improve water quality and riparian corridor protection. Matching species to soils and hydrology is important.
- Bottomland forest restoration could supply products from thinning and harvest activities, often on exceptionally productive land. Waterfowl and other hunting opportunities may also prove economically beneficial and promote conservation.
- Problem exotic species include reed canary grass and Japanese hops.
- Interpretation and promotion of recreation and conservation on the river can garner support for alternative conservation measures.

TILL PLAINS ALLUVIAL PLAINS LTAs

Landscapes, Communities and Species worthy of special consideration in this LTA Type include:		
Landscapes	1000+ acre Bottomland Forest/ Wetland Complexes	
Natural Communities	Riverfront Forest	
	Wet & Wet-mesic Bottomland Forests	
	Mixed Hardwood Mesic Bottomland Forest	
	Bottomland Woodland	
	Other communities include: Wet Bottomland Prairie, Wet-mesic Bottomland Prairie, Sand Prairie, Freshwater Marsh, Shrub Swamp, Glacial Fens, Sandbar/Mudflat	
Plants and Animals (**Bold** = Species of Conservation Concern. Other species are highly dependent on this system)	Forest	**Cerulean Warbler (*Dendroica cerulea*)**
		Prothonotary Warbler (*Protonotaria citrea*)
		Small-mouthed Salamander (*Ambystoma texanum*)
	Savanna	**Indiana Bat (*Myotis sodalis*)**
	Prairie	**Schweinitz's Flatsedge (*Cyperus schweinitzii*)**
		Dotted Monarda (*Monarda punctata* var*. occidentalis*)
		Evening Primrose (*Oenothera clelandii*)
		An Evening Primrose (*Oenothera rhombipetala*)
		A Goldenweed (*Prionopsis ciliata*)
		A Stylisma (*Stylisma pickeringii* var*. pattersonii*)
		Eastern Tiger Salamander **(*Ambystoma tigrinum tigrinum*)**
		Great Plains Toad **(*Bufo cognatus*)**
		Great Plains Narrow-mouthed Toad **(*Gastrophryne olivacea*)**
		Plains Spadefoot **(*Scaphiopus bombifrons*)**
		Illinois Mud Turtle (*Kinosternon flavescens spooneri*)
	Wetlands	**Bergia (*Bergia texana*)**
		Lake-bank Sedge (*Carex lacustris*)
		Sartwell's Sedge (*Carex sartwellii*)
		A Sedge (*Carex sychnocephala*)
		A Sedge (*Carex vesicaria var. monile*)
		An Umbrella Sedge (*Cyperus flavicomus*)
		An Umbrella Grass (*Fuirena simplex var. aristulata*)
		Tufted Loosestrife (*Lysimachia thyrsiflora*)
		A Bulrush (*Schoenoplectus saximontanus*)
		Pale Bulrush (*Scirpus pallidus*)

Landscapes, Communities and Species worthy of special consideration in this LTA Type include:		
		Marsh Skullcap(*Scutellaria galericulata*)
		Meadow-sweet (*Spirea alba*)
		Northern Leopard Frog (*Rana pipiens*)
		Western Fox Snake (*Elaphe vulpina vulpina*)
		Blanding's Turtle (*Emydoidea blandingii*)
		Graham's Crayfish Snake(*Regina grahamii*)
		Eastern Massassauga (*Sistrurus cantenatus catenatus*)
		Great Egret (*Ardea alba*)
		American Bittern (*Botaurus lentiginosus*)
		Black Tern (*Chlidonias niger*)
		Marsh Wren (*Cistothorus palustris*)
		Little Blue Heron (*Egretta caerulea*)
		Common Moorhen (*Gallinula chloropus*)
		Least Bittern (*Ixobrychus exilis*)
		Black-crowned Night Heron (*Nycticorax nycticorax*)
		Pied-billed Grebe (*Podilymbus podiceps*)
		Sora (*Porzana carolina*)
		King Rail (*Rallus elegans*)
		Virginia Rail (*Rallus limicola*)

TILL PLAINS LOESS PRAIRIE HILLS AND BLUFFLANDS LTAs



CHARACTERISTICS: Very steep to moderately rolling landscapes in the northwest corner of Missouri, mantled in 10 to over 100 feet of loess. Historically, over 80% of this area was comprised of prairies, including dry loess hill prairies with numerous rare species. Savannas, woodlands and forest occupied protected slopes. Streams run through loess with exceptional base flow. Some substantial prairie, savanna and woodland restoration opportunities exist, even though this area is largely cropland.

MANAGEMENT ISSUES AND OPPORTUNITIES:

***** Size: over 900,000 acres. Conservation lands comprise 13,000 acres (1.5% of the area). Consequently, private land programs may dominate land conservation efforts Consequently, private land programs may dominate land conservation efforts. MDC owns most of the conservation lands. Prominent conservation lands include Bilby Ranch Lake, Brickyard Hill, Star School Hill Prairie and Tarkio Prairie Conservation Areas (MDC).

* Less than 50 acres of dry loess hills prairie remain in the Blufflands, although several conservation ownerships do exist. Even less mesic and dry-mesic glacial prairie is known from the Loess Hills; however, restoration has exhibited a high resilience.

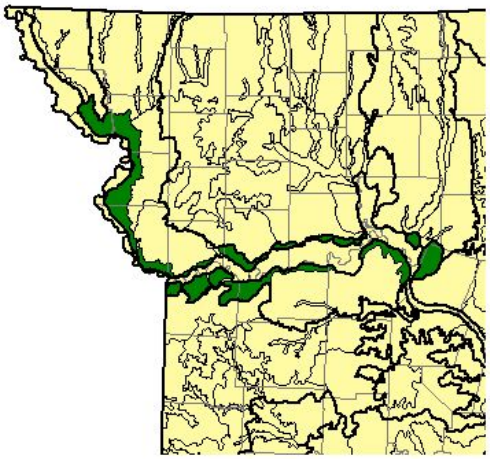
- There are opportunities for savanna and woodland restoration, and forest management on the protected slopes.
- Most streams are impacted by heavy siltation and agricultural runoff.
- Problem exotic species include tree of heaven and black locust.
- The Blufflands offer outstanding views of the Missouri River valley and surrounding hills. Interpretive and recreational opportunities could be created.

TILL PLAINS LOESS PRAIRIE HILLS AND BLUFFLANDS LTAs

Landscapes, Communities and Species worthy of special consideration in this LTA Type include:		
Landscapes	2000+ acre Prairie/Grassland & 500+ acre Deep Loess Bluffland Landscapes	
Natural Communities	Bur Oak Loess/Glacial Till Woodlands	
	Mixed Oak Loess/Glacial Till Woodlands	
	Mixed Oak Loess Glacial Till Forest	
	Other communities include: Dry Loess/Glacial Till Prairie, Dry-mesic Loess/Glacial Till Prairie, Mesic Loess/Glacial Till Prairie	
Plants and Animals	Woodland	Orchard Oriole (*Icterus spurius*)
		Baltimore Oriole (*Icterus galbula*)
		Red-headed Woodpecker (*Melanerpes erythrocephalus*)
		Eastern Phoebe (*Sayornis phoebe*)
		Silver-haired Bat (*Lasionycteris noctivagans*)
		Northern Myotis (*Myotis septentrionalis*
(**Bold** = Species of Conservation Concern. Other species are highly dependent on this system)	Prairie	**Thimbleweed (*Anemone cylindrica*)**
		Low Milk Vetch (*Astragalus lotiflorus*)
		Blue Grama (*Bouteloua gracilis*)
		Hairy Grama (*Bouteloua hirsuta*)
		Downy Painted Cup (*Castilleja sessiliflora*)
		Nine-anther Dalea (*Dalea emneandra*)
		Scarlet Gaura (*Gaura coccinea var. coccinea*)
		A Blazing Star (*Liatris punctata var. nebraskana*)
		Skeleton Plant (*Lygodesmia juncea*)
		Locoweed (*Oxytropis lambertii*)
		Silvery Psoralea (*Pediomelum argophyllum*)
		Large Beard-tongue (*Penstemon grandiflorus*)
		Western Prairie Fringed Orchid (*Platanthera praeclara*)
		Wolfberry (*Symphoricarpos occidentalis*)
		Small Soapweed Yucca (*Yucca glauca*)
		Henslow's Sparrow (*Ammodramus henslowii*)
		Grasshopper Sparrow (*Ammodramus savannarum*)
		Short-eared Owl (*Asio flammeus*)
		Northern Harrier (*Circus cyaneus*)
		Bobolink (*Dolichonyx oryzivorus*)
		Loggerhead Shrike (*Lanius ludovicianus*)

Landscapes, Communities and Species worthy of special consideration in this LTA Type include:		
		Franklin's Ground Squirrel (*Spermophilus franklinii*)
		Dickcissel (*Spiza americana*)
		Greater Prairie-chicken (*Tympanuchus cupido*)
		Bell's Vireo (*Vireo bellii*)

TILL PLAINS LOESS WOODLAND/FOREST BREAKS LTAs



CHARACTERISTICS: Very steep and dissected hills lining the Missouri River. Hills have over 200 feet of local relief, and are often covered in deep loess with frequent mesic coves. The most timbered landscapes in historic north Missouri with very productive mixed oak and mixed hardwood forest communities. Historically, more open oak woodlands occupied the ridges and exposed slopes. Scattered prairies and savannas occupied the most exposed sites. Many streams are short, high gradient headwater creeks. Today, much of the formerly wooded land has been cleared for pasture and cropland. However, in the steepest areas, second growth forest remains, some in rather sizeable blocks. Only a few small prairie and savanna remnants are known.

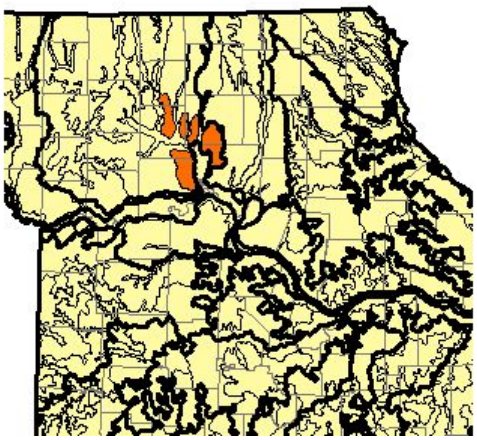
MANAGEMENT ISSUES AND OPPORTUNITIES:

- Size: over 650,000 acres. Conservation lands comprise 23,000acres (3.5% of the area). Consequently, private land programs may dominate land conservation efforts. MDC owns over 11,000 acres. Prominent conservation lands include Riverbreaks, Bluffwoods, Baltimore Bend and Honey Creek Conservation Areas (MDC). Weston Bend and Van Meter State Parks (DNR) total over 1,800 acres.
- While some of these LTAs contain large, contiguous patches of woodland and forest, most have been substantially fragmented.
- Much of the forested acreage is mature second growth. Substantial opportunity to manage a variety of oak woodlands and mixed oak, white oak and mixed hardwood forest communities exists. Some of the best mixed hardwood mesic forest communities occur here. Heavy understories of paw paw, ironwood and honeysuckle will make oak regeneration a challenge.
- Several small hill prairies and associated savannas are known, but most are overgrown with woody invasive species.
- Streams are threatened by agricultural runoff, riparian clearing and sedimentation.
- Woodland and forest management could supply high quality products from thinning and harvest activities on very productive land.
- These steep landscapes provide opportunities for wildlife viewing, trails and hunting.
- Care should be taken during management activities due to steep terrain and erodable soils.

TILL PLAINS LOESS WOODLAND/FOREST BREAKS LTAs

Landscapes, Communities and Species worthy of special consideration in this LTA Type include:		
Landscapes	10,000+ acre Woodland/Forest Complex	
Natural Communities	White Oak and Mixed Oak Loess/Glacial Till Forest	
	Oak-Mixed Hardwood Mesic Loess/Glacial Till Forest	
	Mixed Oak Loess/Glacial Till Woodland	
	White Oak Loess/Glacial Till Woodland	
	Dry Loess/Glacial Till Prairie	
Plants and Animals (**Bold** = Species of Conservation Concern. Other species are highly dependent on this system)	Forest	Yellow-billed Cuckoo (*Coccyzus americanus*)
		Cerulean Warbler (*Dendroica cerulea*)
	Woodland	Timber Rattlesnake (*Crotalus horridus*)
		Orchard Oriole (*Icterus spurius*)
		Baltimore Oriole (*Icterus galbula*)
		Red-headed Woodpecker (*Melanerpes erythrocephalus*)
		Eastern Phoebe (*Sayornis phoebe*)
	Prairie	**Skeleton Plant (*Lygodesmia juncea*)**
		Henslow's Sparrow (*Ammodramus henslowii*)
		Grasshopper Sparrow (*Ammodramus savannarum*)
		Short-eared Owl (*Asio flammeus*)
		Northern Harrier (*Circus cyaneus*)
		Bobolink (*Dolichonyx oryzivorus*)
		Loggerhead Shrike (*Lanius ludovicianus*)
		Dickcissel (*Spiza americana*)
		Greater Prairie-chicken (*Tympanuchus cupido*)
		Bell's Vireo (*Vireo bellii*)

TILL PLAINS LOW PRAIRIE PLAINS LTAs

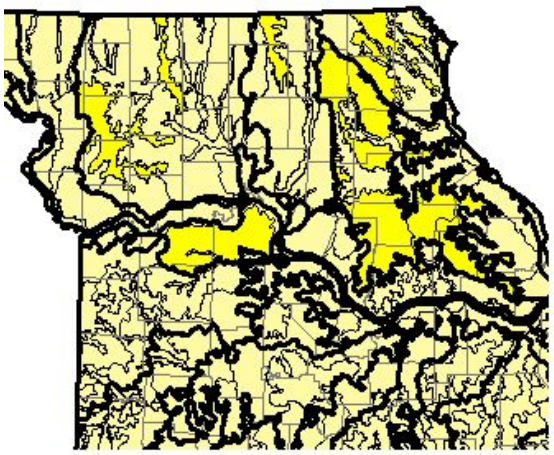


CHARACTERISTICS: Flat plains elevated above and flanking the alluvial plain of the lower Grand River. These seasonally wet plains were historically dominated by a mosaic of lowland and upland prairie with scattered wetlands. Streams are mainly low gradient with a heavy silt load. Today, this area is dominated by a mixture of cropland and pasture. Unique lowland prairie and wetland restoration opportunities exist.

MANAGEMENT ISSUES AND OPPORTUNITIES:

- Size: over 300,000 acres. Only minor components of several public land tracts occur. Consequently, private land programs may dominate land conservation efforts. Most conservation lands are on Fountain Grove Conservation Area (MDC), but also include small portions of Pershing State Park (DNR) and Swan Lake National Wildlife Refuge (USFWS).
- Only minimal remnants of lowland prairie, upland prairie and wetland communities remain. Most lands are agricultural; however, restoration efforts have proven successful.
- Timbered areas are mainly former prairie. Forest and woodland conservation opportunities are confined to narrow ribbons of streamside forest**.**
- Low gradient streams suffer from siltation and agricultural runoff.
- Native forage from prairie restoration would enhance conservation incentives.
- Existing public lands offer interpretive and recreational opportunities in lowland prairie communities.
- ***Because little forest management opportunity exists, communities and species of special consideration are not included.***

TILL PLAINS PRAIRIE PLAINS LTAs



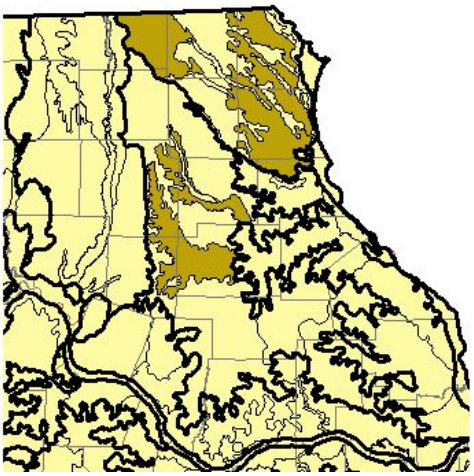
CHARACTERISTICS: High, flat divides that were historically over 90% prairie. The Prairie Plains includes Cameron, Marshall, Gilman City, and Unionville uplands, as well as high plains in the Wyaconda River region and Claypan Till Plains subsection of east-central Missouri. Prairies historically included seasonally saturated hardpan areas, ephemeral wetlands, and isolated savannas. Streams are mainly intermittent headwaters and perennial creeks with low gradients. These LTAs are heavily dominated by cropland, but can still harbor large, open grasslands.

MANAGEMENT ISSUES AND OPPORTUNITIES:

* Size: nearly 4 million acres. Conservation lands comprise 19,000 (a fraction of the area); consequently, private land programs may dominate land conservation efforts. Most of the conservation lands are owned by MDC. Most of the conservation lands are owned by MDC (15,700 acres). Prominent conservation lands include Pony Express, King Lake, Mineral Hills, Blind Pony and Whetstone Creek Conservation Areas (MDC).
* These landscapes offer some of the largest contiguous blocks of open lands and grasslands in the Till Plains; therefore, potential exists for promoting grassland wildlife, including several remnant prairie chicken leks.
* Minimal remnants of prairies, wetlands and savannas exist, but restoration efforts have been successful.
* Forest and woodland conservation opportunities are limited to slopes and narrow strips along drainages.
* As most lands are agricultural, wildlife-friendly agricultural practices would be beneficial.
* Low gradient streams suffer from siltation, riparian clearing and agricultural runoff.
* Native forage from prairie restoration may provide conservation incentives.
* Prevalence of roads and towns offers opportunities for interpretation, picnic areas and short trails.

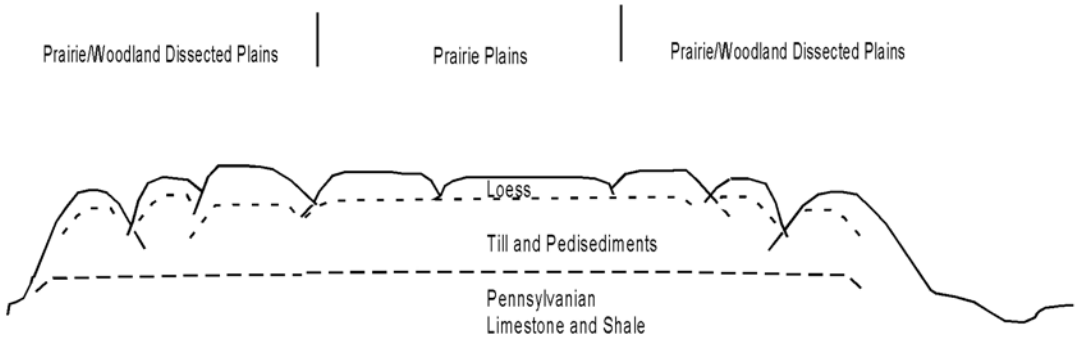
Because little forest management opportunity exists, communities and species of special consideration are not included.

TILL PLAINS PRAIRIE/WOODLAND DISSECTED PLAINS LTAs



CHARACTERISTICS: Gently to moderately rolling uplands with relatively shallow, wide valleys and up to 150 feet of local relief. This LTA type is associated with stream valleys in the eastern Till Plains, including the Fox, Wyaconda and upper Salt River basins. Streams are mainly low gradient, with sand or bedrock channels and well-developed floodplains. Prairie historically extended from the adjacent plains onto higher, exposed locations and graded into oak savanna and woodland on slopes and lower, protected sites. Forest would have occupied the most protected slopes and floodplains. Today a mosaic of cropland and grassland exists, with timber confined to the most protected slopes and bottoms.

Plains and Dissected Plains LTAs in the Eastern Till Plains Section



MANAGEMENT ISSUES AND OPPORTUNITIES:

- Size: over 1 million acres. Conservation lands comprise over 19,000 acres (2% of the area). Consequently, private land programs may dominate conservation efforts. Almost all conservation lands are managed by MDC. Prominent conservation lands include Deer Ridge, Heath Memorial, Indian Hills, Clark and Fox Valley Lake Conservation Areas (MDC).
- Most of the uplands have been converted to cool-season pasture; cropland occupies flattest uplands and most floodplains. Patches of wooded areas remain. Most habitats are highly fragmented.

*Forest and woodland management opportunities are associated with the more dissected terrain along stream valleys. Most woodlands have a dense forest structure.

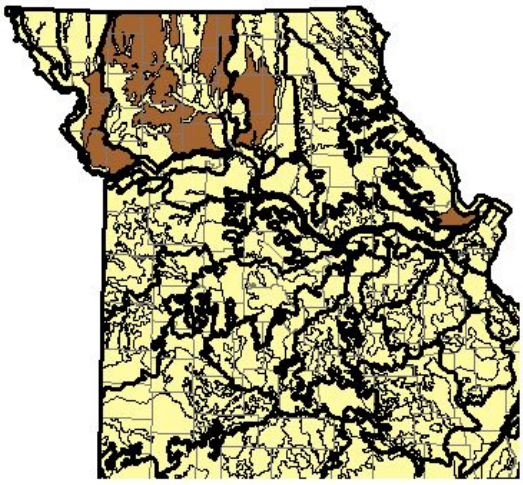
- Streams are degraded by channelization, riparian corridor clearing, sedimentation and agricultural runoff.
- Grassland and savanna management could supply native forage; forest restoration may provide productive timber lands in the long term.
- There is high use of a limited number of public lands.

TILL PLAINS PRAIRIE/WOODLAND DISSECTED PLAINS LTAs

Landscapes, Communities and Species worthy of special consideration in this LTA Type include:		
Landscapes	2000+ acre Prairie/Grassland	
	10,000+ acre Savanna/Woodland Landscapes	
Natural Communities	Bur Oak Loess/Glacial Till Woodlands	
	Mixed Oak Loess/Glacial Till Woodlands	
	White Oak Loess/Glacial Till Woodlands	
	Dry-mesic Loess/Glacial Till Savanna	
	Mixed Oak Loess/Glacial Till Forest	
	White Oak Loess/Glacial Till Forest	
	Riverfront Bottomland Forest	
	Mixed Hardwood Mesic Bottomland Forest	
	Wet Bottomland Forest	
	Dry-mesic Loess/Glacial Till Prairie	
	Mesic Loess/Glacial Till Prairie	
Plants and Animals (**Bold** = Species of Conservation Concern. Other species are highly dependent on this system)	Forest	**Rose Turtlehead (*Chelone oblique var. speciosa*)**
		Southern Arrow-wood (*Viburnum dentatum var. deamii*)
		Cerulean Warbler (Dendroica cerulean)
		Red Shouldered Hawk (Buteo lineatus)
	Woodland	**Grove Sandwort (*Arenaria lateriflora*)**
		Yellow-billed Cuckoo (*Coccyzus americanus*)
		Eastern Wood-pewee (*Contopus virens*)
		Orchard Oriole (*Icterus spurius*)
		Baltimore Oriole (*Icterus galbula*)
		Red-headed Woodpecker (*Melanerpes erythrocephalus*)
		Eastern Phoebe (*Sayornis phoebe*)
		Silver-haired Bat (*Lasionycteris noctivagans*)
		Northern Myotis (*Myotis septentrionalis*)
		Field Sparrow (*Spizella pusilla*)
		Brown Thrasher (*Toxostoma rufum*)
		Eastern Kingbird (*Tyrannus tyrannus*)
		Indiana Bat (*Myotis sodalis*)
	Savanna	American Tree Sparrow (*Spizella arborea*)
		Field Sparrow (*Spizella pusilla*)
		Brown Thrasher (*Toxostoma rufum*)
		Eastern Kingbird (*Tyrannus tyrannus*)
		Indiana Bat (*Myotis sodalis*)

Landscapes, Communities and Species worthy of special consideration in this LTA Type include:		
	Prairie	**Henslow's Sparrow (*Ammodramus henslowii*)**
		Grasshopper Sparrow (*Ammodramus savannarum*)
		Short-eared Owl (*Asio flammeus*)
		Northern Harrier (*Circus cyaneus*)
		Bobolink (*Dolichonyx oryzivorus*)
		Loggerhead Shrike (*Lanius ludovicianus*)
		Dickcissel (*Spiza americana*)
		Greater Prairie-chicken (*Tympanuchus cupido*)
		Bell's Vireo (*Vireo bellii*)

TILL PLAINS PRAIRIE/WOODLAND HILLS LTAs



CHARACTERISTICS: Broad, flat to gently rounded divides grade into gentle to moderately sloping lands with up to 150 feet of local relief. This LTA type includes scarped plains on the lower Platte River, low hills in St. Charles County, and much of the Grand River basin uplands. Historically, gently sloping upland prairie was interspersed with wooded valleys that graded from oak savanna, through woodlands, to forest in the most protected locations. Floodplains supported a mosaic of bottomland forest, wet prairie and marshes. Streams have mainly sand bed channels and well-developed floodplains. Lands formerly prairie and savanna have been converted to pasture or cropland, while wooded slopes have been fragmented into pasture and dense second-growth forest of reduced diversity. Streams are often channelized and/or degraded by heavy siltation and agricultural runoff. However, opportunities to restore a variety of natural communities in these landscapes still exist.

MANAGEMENT ISSUES AND OPPORTUNITIES:

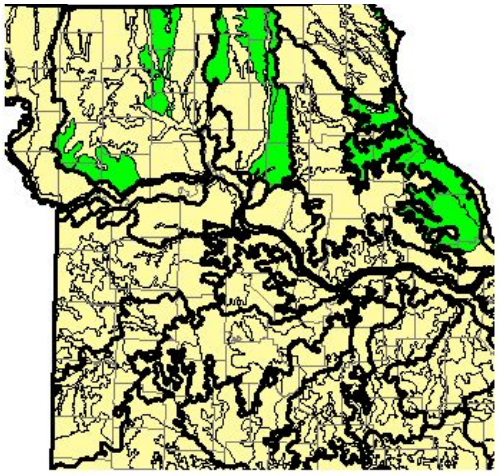
* Size: almost 3.5 million acres. Conservation lands comprise 68,000 acres (2% of the area); consequently, private land programs may dominate land conservation efforts. MDC owns much of the conservation lands (42,000 acres), though the U.S. Army Corps of Engineers has some ownership at Smithville Lake. Prominent conservation lands include Seat, Elam Bend, Bonanza, Bunch Hollow, Mussel Fork, Platte Falls and Busch Conservation Areas (MDC); and Wallace State Park (DNR).
* While only a few prairie remnants are known, large grassland landscapes (including the Dunn Ranch-Pawnee Prairie Grassland Focus Area) are common in the region and support grassland wildlife.
* Moderately sized blocks of savanna, woodland and upland forest communities are present. Most current savannas and woodlands have a dense, forest-like structure. Substantial restoration potential remains.
* Bottomland forest and wetlands will require restoration and management activities.
* Streams are impacted by channelization, siltation and agricultural runoff, though Shoal, Marrowbone and Mussel Fork Creeks are of exceptional quality.
* Problem exotic species include garlic mustard, autumn olive, and sericea lespedeza.
* Grassland and savanna management could supply native forage; woodland and forest restoration may provide productive timber lands in the long term.
* These landscapes offer opportunities for upland game hunting, fishing and wildlife viewing.
* Large-scale restoration activities will require partnerships between private and public entities.

TILL PLAINS PRAIRIE/WOODLAND HILLS LTAs

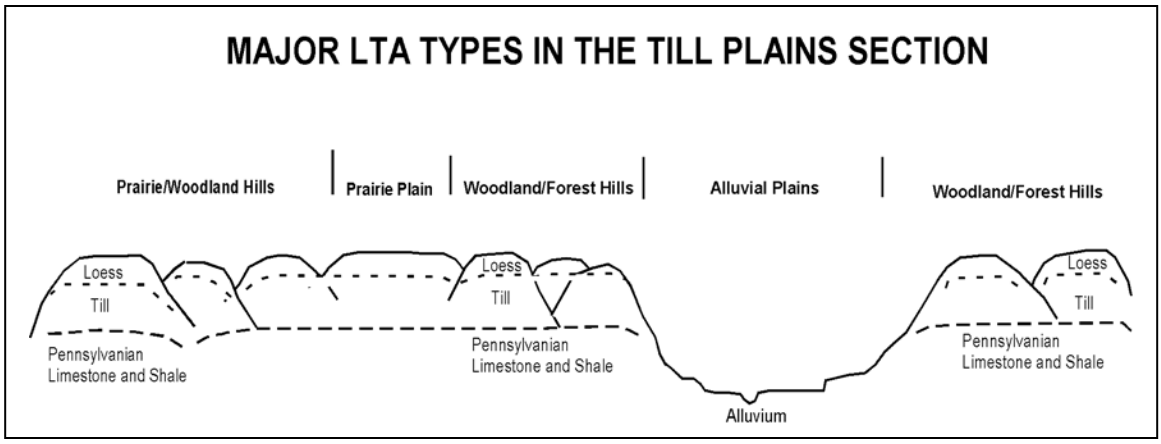
Landscapes, Communities and Species worthy of special consideration in this LTA Type include:		
Landscapes	2000+ acre Prairie/Grassland	
	10,000+ acre Savanna/Woodland/Forest Complex	
Natural Communities	Mixed Oak and White Oak Dry-mesic Loess/Glacial Till Forest	
	Oak-Mixed Hardwood Mesic Loess/Glacial Till Forest	
	Riverfront Bottomland Forest	
	Mixed Hardwood Mesic Bottomland Forest	
	Bur Oak Loess/Glacial Till Woodland Mixed Oak Loess/Glacial Till Woodlands White Oak Loess/Glacial Till Woodlands	
	Dry-mesic Loess/Glacial Till Savanna	
	Dry-mesic Loess/Glacial Till Prairie, Mesic Loess/Glacial Till Prairie	
Plants and Animals (**Bold** = Species of Conservation Concern. Other species are highly dependent on this system)	Forest	**Rock Elm (*Ulmus thomasii*)**
		Wood Frog (*Rana sylvatica*)
	Woodland	Timber Rattlesnake (*Crotalus horridus*)
		Yellow-billed Cuckoo (*Coccyzus americanus*)
		Eastern Wood-pewee (*Contopus virens*)
		Orchard Oriole (*Icterus spurius*)
		Baltimore Oriole (*Icterus galbula*)
		Red-headed Woodpecker (*Melanerpes erythrocephalus*)
		Great Crested Flycatcher (*Myiarchus crinitus*)
		Eastern Phoebe (*Sayornis phoebe*)
		Silver-haired Bat (*Lasionycteris noctivagans*)
	Savanna	Northern Bobwhite (*Colinus virginianus*)
		American Tree Sparrow (*Spizella arborea*)
		Field Sparrow (*Spizella pusilla*)
		Brown Thrasher (*Toxostoma rufum*)
		Eastern Kingbird (*Tyrannus tyrannus*)
		Harris's sparrow (*Zonotrichia querula*)
		Indiana Bat (*Myotis sodalis*)
		Northern Prairie Skink (*Eumeces septentrionalis septentrionalis*)
		Henslow's Sparrow (*Ammodramus henslowii*)

Landscapes, Communities and Species worthy of special consideration in this LTA Type include:		
	Prairie	**Mead's Milkweed (*Asclepias meadii*)**
		Dwarf Chinquapin Oak (*Quercus prinoides*)
		Regal Fritillary (*Speyeria idalia*)
		Northern Prairie Skink (*Eumeces septentrionalis septentrionalis*)
		Henslow's Sparrow (*Ammodramus henslowii*)
		Short-eared Owl (*Asio flammeus*)
		Upland Sandpiper (*Bartramia longicauda*)
		Northern Harrier (*Circus cyaneus*)
		Bobolink (*Dolichonyx oryzivorus*)
		Loggerhead Shrike (*Lanius ludovicianus*)
		Dickcissel (*Spiza americana*)
		Greater Prairie-chicken (*Tympanuchus cupido*)
		Bell's Vireo (*Vireo bellii*)
		Franklin's Ground Squirrel (*Spermophilus franklinii*)

TILL PLAINS WOODLAND/FOREST HILLS LTAs



CHARACTERISTICS: Strongly rolling to relatively rugged hills with rather narrow ridges, steep sideslopes, narrow valleys and over 200 feet of local relief. Uplands are mainly in till with a thin layer of loess, while lower slopes grade into sedimentary residuum. This LTA type includes hilly lands associated with the Crooked, Thompson, Weldon, Upper Chariton, Salt and Mississippi Rivers. Historically, this area consisted of a complex mosaic of narrow ridgetop prairies and savannas, grading into oak woodlands on upper slopes, with well-developed oak and mixed hardwood forests on protected slopes and bottoms. Floodplains with marshes and wet prairies are interspersed throughout. Streams have mainly sand bed channels and well-developed floodplains of variable soil texture. Today, while much of the landscape has been cleared for pasture, the largest blocks of remaining timber in this region occur here. Most is dense, second growth oak forest, fragmenting and simplifying a potentially diverse landscape.



MANAGEMENT ISSUES AND OPPORTUNITIES:

- Size: almost 3 million acres. Conservation lands comprise nearly 188,000 acres (6% of the area). Much of the conservation lands are associated with Smithville and Mark Twain Lakes (U.S. Army Corps of Engineers), but MDC owns over 60,000 acres. Prominent conservation lands include Crooked River, Poosey, Locust Creek, Union Ridge, Mineral Hills, Sugar Creek, Rebel's Cove, White and Logan Conservation Areas (MDC); Trice-Dedman Memorial Woods (TNC); four State Parks cover over 17,000 acres: Crowder, Thousand Hills, Long Branch and Cuivre River (DNR).
- While some of these LTAs contain large, contiguous patches of woodland and forest, most have been substantially fragmented.
- Urbanization has substantial impacts in Lincoln, Adair and Clay counties.
- Much of the forested acreage is mature; and much of the wooded areas have been impacted by grazing and past management activities. Substantial opportunities to manage and restore a variety of oak woodlands and mixed oak, white oak and mixed hardwood and bottomland forest communities exist.
- A few prairies, savannas and wetlands are known, but they tend to be small, isolated remnants; restoration potential exists.
- Many streams are threatened by channelization, poor riparian corridors, agricultural runoff and sedimentation.
- Woodland and forest management could supply products from thinning and harvest activities, often on very productive land.
- Varied outdoor recreation opportunities exist, including hunting, fishing, wildlife viewing, hiking, and camping.

TILL PLAINS WOODLAND/FOREST HILLS LTAs

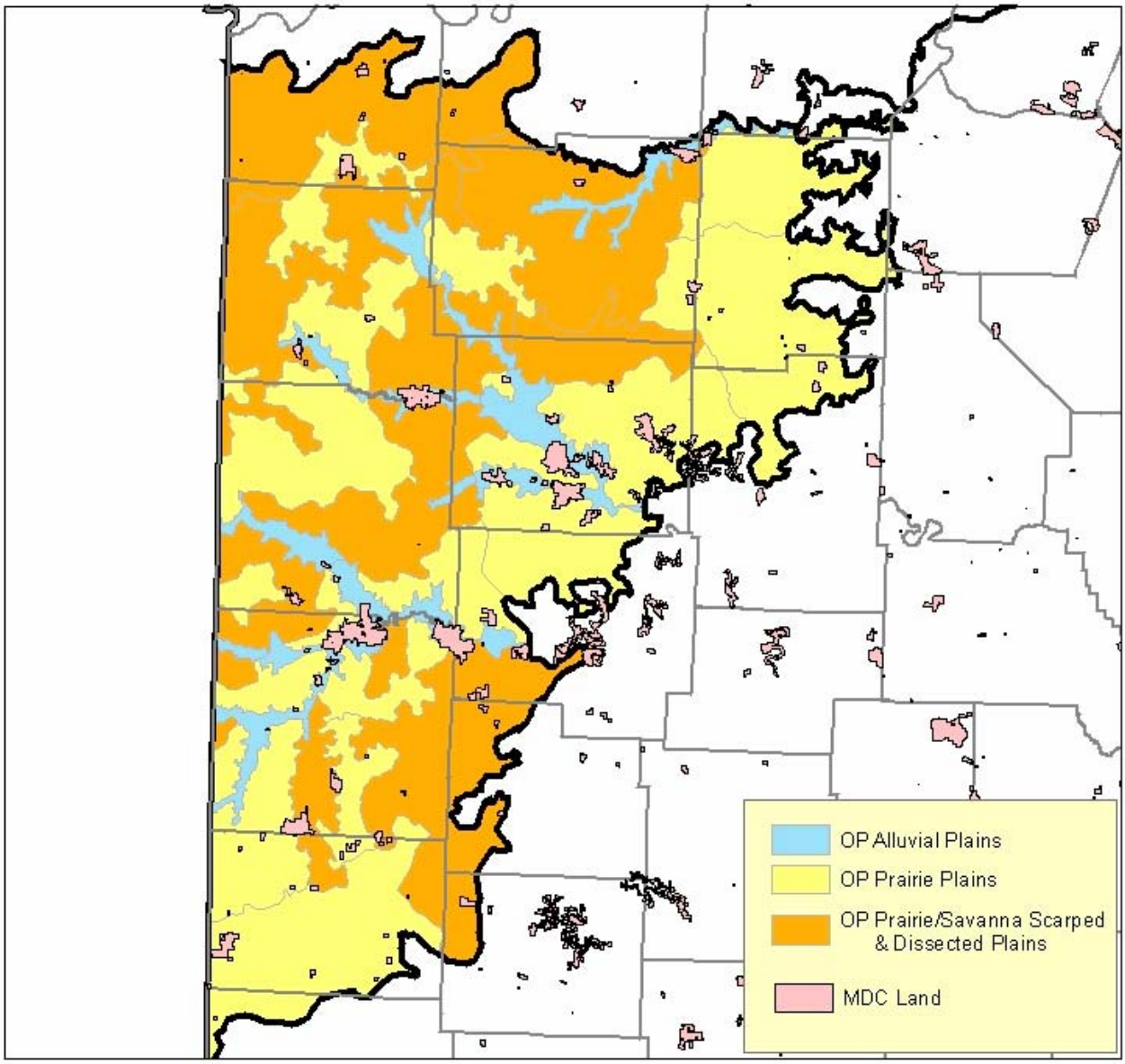
Landscapes, Communities and Species worthy of special consideration in this LTA Type include:		
Landscapes	10,000+ acre Woodland/Forest Landscapes	
	2000+ acre Prairie/Savanna/Woodland Landscapes	
Natural Communities	Mixed Oak and White Oak Dry-mesic Loess/Glacial Till Forests	
	Oak-Mixed Hardwood Mesic Loess/Glacial Till Forest	
	Riverfront Bottomland Forest	
	Mixed Hardwood Mesic Bottomland Forest	
	Mixed Oak Loess/Glacial Till Woodland White Oak Loess/Glacial Till Woodland	
	Dry-mesic Loess/Glacial Till Savanna	
	Dry-mesic Loess/Glacial Till Prairie, Glacial Fen	
Plants and Animals (**Bold** = Species of Conservation Concern. Other species are highly dependent on this system)	Forest	**Long-bracted Orchid (*Coeloglossum veride var. virescens*)**
		False Mermaid (*Floerkea proserpinacoides*)
		Quaking Aspen (*Populus tremuloides var.tremuloides*)
		Nannyberry (*Viburnum lentago*)
		Ringed Salamander (*Ambystoma annulatum*)
		Four-toed Salamander (*Hemidactylium scatatum*)
		Wood Frog (*Rana sylvatica*)
		Yellow-billed Cuckoo (*Coccyzus americanus*)
		Cerulean Warbler (*Dendroica cerulea*)
	Woodland	Eastern Wood-pewee (*Contopus virens*)
		Orchard Oriole (*Icterus spurius*)
		Baltimore Oriole (*Icterus galbula*)
		Red-headed Woodpecker (*Melanerpes erythrocephalus*)
		Great Crested Flycatcher (*Myiarchus crinitus*)
		Eastern Phoebe (*Sayornis phoebe*)
		Silver-haired Bat (*Lasionycteris noctivagans*)
		Northern Myotis (*Myotis septentrionalis*)
	Savanna	Northern Bobwhite (*Colinus virginianus*)
		American Tree Sparrow (*Spizella arborea*)
		Field Sparrow (*Spizella pusilla*)
		Brown Thrasher (*Toxostoma rufum*)

Landscapes, Communities and Species worthy of special consideration in this LTA Type include:		
		Eastern Kingbird (*Tyrannus tyrannus*)
		Harris's Sparrow (*Zonotrichia querula*)
		Indiana Bat (*Myotis sodalis*)
	Prairie	**Auriculate False Foxglove (*Agalinis auriculata*)**
		Tall Agrimony (*Agrimonia gryposepala*)
		Prairie Lily (*Lilium philadelphicum var.andinum*)
		Western Prairie Fringed Orchid (*Platanthera praeclara*)
		Dwarf Chinquapin Oak (*Quercus ellipsoidalis*)
		Northern Crawfish Frog (*Rana areolata circulosa*)
		Henslow's Sparrow (*Ammodramus henslowii*)
		Grasshopper Sparrow (*Ammodramus savannarum*)
		Short-eared Owl (*Asio flammeus*)
		Northern Harrier (*Circus cyaneus*)
		Bobolink (*Dolichonyx oryzivorus*)
		Loggerhead Shrike (*Lanius ludovicianus*)
		Dickcissel (*Spiza americana*)
		Greater Prairie-chicken (*Tympanuchus cupido*)
		Bell's Vireo (*Vireo bellii*)
	Glades/ Cliffs	**Wild Sarsaprilla (*Aralia nudicaulis*)**
		Snow Trillium (*Trillium nivale*)

OSAGE PLAINS SECTION

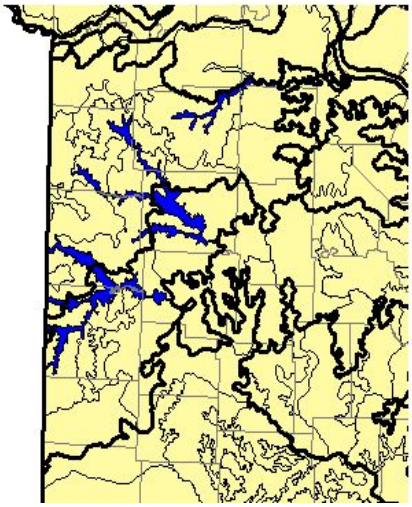
The Osage Plains Section is an unglaciated prairie plain that extends from west-central Missouri west into Kansas. A flat to gently rolling landscape underlain mainly by Pennsylvanian-age shale, sandstone, and limestone, the Osage Plains was historically nearly pure tallgrass prairie. It also contains extensive wetlands associated with streams of the upper Osage River system.

Geographic differences in landform, geology, soils and vegetation produce three Lantype Association Types within Missouri. Osage Plains Prairie Plains, Prairie/Savanna Dissected Plains, and Alluvial Plains. Forest Resources are rather limited in this primarily prairie region. However, savannas, woodland and forest resources do occur in the Dissected Plains and Alluviala Plains Landtypes.



Osage Plains LTA Types and MDC Lands

OSAGE PLAINS ALLUVIAL PLAINS LTAs



CHARACTERISTICS: Confined to the broad alluvial plains (≥ 1 mile wide) of the upper Osage River basin and the Blackwater River within the Osage Plains ecological section. These reaches are broader and lower gradient, with historically more prairie and wetlands than the reaches within the Ozarks section downstream. Streams have a variety of alluvial substrates, often loamy or clayey materials. Historically, the Alluvial Plains provided extensive open and wooded wetland habitat – an important resource for migrating and breeding birds. Today, the rivers are largely channelized and leveed and their floodplains cleared for cropland. Substantial remnant wetlands exist in the lower reaches of these rivers, but hydrology is altered and much of the timber has been killed by backwater flooding from Truman reservoir.

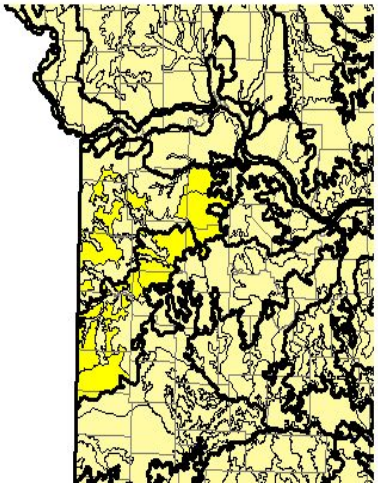
MANAGEMENT ISSUES AND OPPORTUNITIES:

- Size: over 320,000 acres. Conservation lands comprise 51,000 acres (16% of the area). Many of the conservation lands are owned by MDC, but over 22,000 acres are associated with Truman reservoir (U.S. Army Corps of Engineers). Prominent conservation lands include Settle's Ford, Four Rivers, and Schell-Osage Conservation Areas (CAs) (MDC) and Marmaton River Bottoms Wet Prairie (TNC).
- The dynamic nature of the river ecosystems has been largely altered by levees, channelization and the reservoir below. Backwater flooding from Truman reservoir has caused extensive death of bottomland timber. However, large wetland conservation areas have illustrated resilience, and substantial opportunity to coordinate with wetland conservation on adjacent private lands exists. Water management upstream is an important long-term issue as well.
- Restoration of bottomland forest should pay attention to current hydrologic regime.
- Once extensive wet prairie ecosystems are rare and isolated today.
- Streams are degraded by channelization, riparian corridor clearing, sedimentation and agricultural runoff.
- Bottomland forest restoration could supply products from thinning and harvest activities, often on exceptionally productive land. Waterfowl and other hunting opportunities may also prove economically valuable and promote conservation.
- Interpretation and promotion of recreation on the rivers and adjacent wetlands can garner support for alternative conservation measures.

OSAGE PLAINS ALLUVIAL PLAINS LTAs

Landscapes, Communities and Species worthy of special consideration in this LTA Type include:		
Landscapes	1000+ acre Bottomland Forest/Wetland Complexes	
Natural Communities	Riverfront Bottomland Forest	
	Wet Bottomland Forest	
	Wet-mesic Bottomland Forest	
	Mesic Bottomland Woodland	
	Wet-mesic Bottomland Woodland	
	Other Natural Communities: Wet Bottomland Prairie, Wet-mesic Bottomland Prairie, Freshwater Marsh, Shrub Swamp	
Plants and Animals (**Bold** = Species of Conservation Concern. Other species are highly dependent on this system)	Forest	Yellow-billed Cuckoo (*Coccyzus americanus*)
		Cerulean Warbler (*Dendroica cerulea*)
		Prothonotary Warbler (*Protonotaria citrea*)
	Woodland	Chuck-will's-widow (*Caprimulgus carolinensis*)
		Eastern Wood-pewee (*Contopus virens*)
		Orchard Oriole (*Icterus spurius*)
		Baltimore Oriole (*Icterus galbula*)
		Red-headed Woodpecker (*Melanerpes erythrocephalus*)
	Prairie	**A Sedge (*Carex arkansana*)**
	Wetland	**American Bittern (*Botaurus lentiginosus*)**
		Marsh Wren (*Cistothorus palustris*)
		Black Tern (*Chlidonias niger*)
		Rusty Blackbird (*Euphagus carolinus*)
		Least Bittern (*Ixobrychus exilis*)
		Little Blue Heron (*Egretta caerulea*)
		Black-crowned Night Heron (*Nycticorax nycticorax*)
		Sora (*Porzana carolina*)
		King Rail (*Rallus elegans*)
		Virginia Rail (*Rallus limicola*)

OSAGE PLAINS PRAIRIE PLAINS LTAs



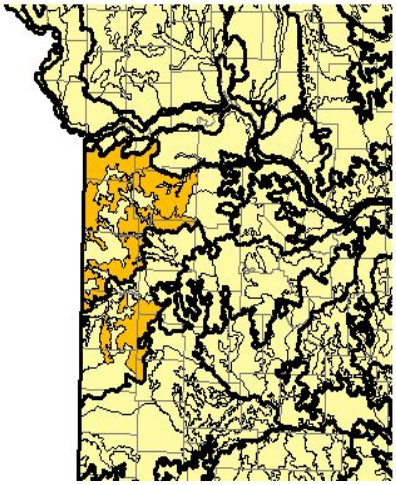
CHARACTERISTICS: The flattest, non-alluvial plains within the Osage Plains Section; less than 50 feet of local relief. The prairie plains include high divides, plains between scarped lands and low smooth plains. Historically, over 90% of this area existed as prairie. Prairies included seasonally saturated hardpan areas, ephemeral wetlands and isolated savannas. Streams were mainly low gradient with a sandy bed channel and well-developed floodplains. Today, the landscape is a mixture of pasture and cropland with substantial existing prairie remnants, many of them traditional hay meadows. Most remnant prairie in the Osage Plains occurs in this LTA type.

MANAGEMENT ISSUES AND OPPORTUNITIES:

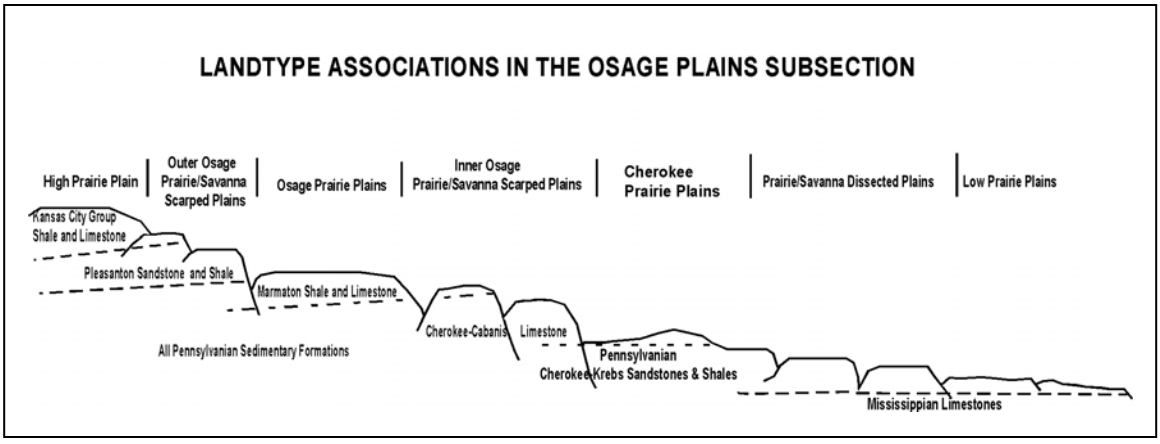
* Size: almost 2 million acres. Conservation lands comprise 49,000 acres (3% of the area). Consequently, private land programs may dominate land conservation efforts. Many of the conservation lands are associated with Truman reservoir. MDC owns over 19,000 acres. Prominent conservation lands include Reed, Kearn, and Shawnee Trail CAs (MDC) and many small prairie remnants including Hi Lonesome, Mora, Paintbrush, Taberville Prairie CAs (MDC), Friendly Prairie, Lattner Prairie (MPF), Goodnight-Henry Prairie (TNC), plus Prairie State Park (DNR).
* Some of the largest, contiguous blocks of open lands and grasslands in the Osage Plains. This has important implications for grassland wildlife, which includes numerous remnant prairie-chicken leks. Several Grassland Focus Areas are here.
* Over 15,000 acres of prairie remnants, most of them traditional hay meadows. Restoration efforts have proven successful, and wildlife-friendly agricultural practices would be beneficial.
* While removal of trees from fence-lines and draws is an important practice, shrub covered riparian corridors are an important habitat.
* Carefully applied periodic and temporary prescribed grazing is a viable management tool.
* Low gradient streams suffer from siltation and agricultural runoff.

* ***Tree-covered areas are often composed of invasive tree species in former prairie or savanna. Reduction of woody vegetation can help minimize predation on grassland birds. Therefore forest and woodland conservation targets are inappropriate to pursue in this landscape.***

OSAGE PLAINS
PRAIRIE/SAVANNA DISSECTED AND SCARPED PLAINS LTAs



CHARACTERISTICS: Broad flat plains give way to abrupt scarps or moderately rolling dissected plains with less than 150 feet of local relief. Historically, prairie dominated the highest, flattest areas and graded into oak savanna and woodland in more broken topography. Streams have slightly higher gradient and more frequent bedrock bases compared to adjacent plains. Today, most prairies and savannas have been converted to cool-season pasture and some cropland. A substantial number of prairie remnants and preserves are in these landscapes, most surviving as traditional hay meadows. Many former savannas and woodlands exist today as dense second growth forest.



MANAGEMENT ISSUES AND OPPORTUNITIES:

- Size: over 1.7 million acres. Conservation lands make up 28,000 acres (2% of the area). Consequently, private land programs may dominate land conservation efforts. Most conservation lands are MDC managed. Prominent conservation lands include Burr Oak Woods, Amarugia Highlands, Perry, Bushwhacker, Osage Prairie, Wah-Kon-Tah Prairie, Stoney Point Prairie and a substantial part of Schell-Osage CAs (MDC). Also includes Schwartz Prairie, Stillwell Prairie (MPF) and Knob Noster State Park (DNR). There are several Grassland Focus Areas.
- Urbanization in several areas may limit management options.
- While some of the largest patches of grassland in the Osage Plains occur on these LTAs, they are mainly fescue pasture with limited diversity. However, substantial prairie remnants offer opportunity for landscape-scale restoration. Sustainable prescribed grazing is an important management tool.
- Very few quality savanna or woodland communities remain. Extensive post oak (bur oak)-chinquapin oak limestone woodlands were unique to these landscapes. Prescribed fire has illustrated the resiliency of prairie and woodland systems. Numerous opportunities to restore natural communities exist in Kansas City metropolitan area. However, bush honeysuckle and garlic mustard are very problematic invasive exotics.
- Streams are degraded by channelization, riparian corridor clearing, sedimentation and agricultural runoff. Native grassland and woodland management could supply valuable forage.
- Prevalence of roads and towns offers opportunities for interpretation, picnic grounds and short hiking trails.

O3 OSAGE PLAINS PRAIRIE/SAVANNA DISSECTED AND SCARPED PLAINS LTAs

Landscapes, Communities and Species worthy of special consideration in this LTA Type include:		
Landscapes	1000+ acre Prairie/Savanna and Woodland Complexes	
Natural Communities	Dry and Dry-mesic Limestone/Dolomite Woodlands	
	Post Oak and Mixed Oak Sandstone Woodlands	
	Limestone/Dolomite Savanna	
	Sandstone Savanna	
	Dry-mesic Limestone/Dolomite Prairie	
	Dry-mesic Sandstone/Shale Prairie	
	Limestone Glade	
Plants and Animals (**Bold** = Species of Conservation Concern. Other species are highly dependent on this system)	Woodland	Chuck-will's-widow (*Caprimulgus carolinensis*)
		Eastern Wood-pewee (*Contopus virens*)
		Orchard Oriole (*Icterus spurius*)
		Baltimore Oriole (*Icterus galbula*)
		Red-headed Woodpecker (*Melanerpes erythrocephalus*)
	Savanna	Northern Bobwhite (*Colinus virginianus*)
		Field Sparrow (*Spizella pusilla*)
		Brown Thrasher (*Toxostoma rufum*)
		Harris's Sparrow (*Zonotrichia querula*)
	Prairie	**Mead's Milkweed (*Asclepias meadii*)**
		Harvey's Beak-rush (*Rhynchospora harveyi*)
		Grassland Crayfish (*Procambarus gracilis*)
		Prairie Mole Cricket (*Gryllotalpa major*)
		Regal Fritillary (*Speyeria idalia*)
		Great Plains Narrow-mouthed Toad (*Gastrophryne olivacea*)
		Northern Crawfish Frog (*Rana areolata circulosa*)
		Bullsnake (*Pituophis melanoleucus sayi*)
		Henslow's Sparrow (*Ammodramus henslowii*)
		Grasshopper Sparrow (*Ammodramus savannarum*)
		Sprague's Pipit (*Anthus spragueii*)
		Short-eared Owl (*Asio flammeus*)
		Upland Sandpiper (*Bartramia longicauda*)
		Swainson's Hawk (*Buteo swainsoni*)
		Smith's Longspur (*Calcarius pictus*)

Landscapes, Communities and Species worthy of special consideration in this LTA Type include:		
		Lark Sparrow (*Chondestes grammacus*)
		Northern Harrier (*Circus cyaneus*)
		Loggerhead Shrike (*Lanius ludovicianus*)
		Dickcissel (*Spiza americana*)
		Eastern Meadowlark (*Sturnella magna*)
		Greater Prairie-chicken (*Tympanuchus cupido*)
		Scissor-tailed Flycatcher (*Tyrannus forficatus*)
		Bell's Vireo (*Vireo bellii*)

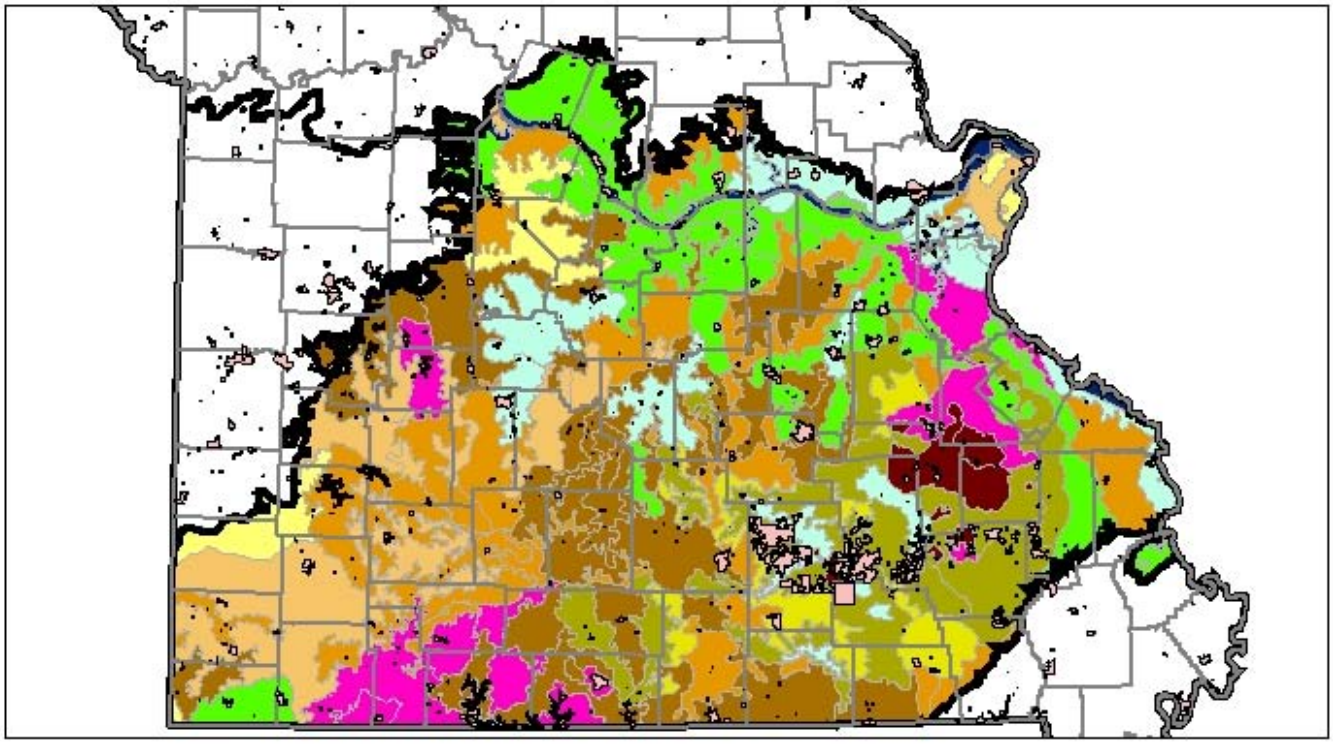
OZARK HIGHLANDS SECTION

The Ozark Highlands is a distinctive biogeographic region that includes most of southern Missouri and much of northern Arkansas and small parts of Illinois, Oklahoma, and Kansas. Geologically, the Ozark Highlands is a low structural dome of essentially horizontally bedded strata that has been undergoing erosion and weathering for a quarter billion years into a thoroughly dissected plateau. The exceptional length of geologic erosion, one of the longest in the United States, coupled with a central geographic location in North America and tremendous physiographic diversity, has created a region of unique ecosystems. Over two hundred endemic species are present.

Millennia of fluvial erosion, transport, deposition, and subterranean dissolution of carbonate bedrock have created a diversity of landforms that vary geographically in degree of relief, dissection, and parent materials and in soil and natural vegetation patterns. Throughout the Ozarks carbonate bedrock dominates, and karst features and other evidence of long-standing and pervasive rock solution characterize the entire region. The highest and least dissected parts of the Ozarks are maintained as flat to gently rolling plains that have very deep accumulations of limestone, dolomite, and chert residuum from which the soils have formed. These relatively droughty upland plains formerly supported prairies, savannas, and open woodlands. The plains give way to rolling hills closer to drainages, and then to the rugged, highly dissected hills and breaks flanking major streams that geographically dominate the section. The streams cut through a variety of geologic formations, creating multifarious landform, soil, and vegetation patterns. Residual soils in the hills are deep, rocky, and highly weathered, and they formerly supported oak and oak-pine woodlands and forest. Areas of shallow soils and bedrock exposure are common, but they vary in landscape position and extent. Rare and unique species are associated with the shallow-soil glades of the region. The streams of the Ozark Highlands are an outstanding and treasured resource. Most are spring-fed and carry very little suspended material. They occupy narrow, sinuous, entrenched valleys. Because the region is karstic, many stream channels and valleys lose water to subterranean passageways, while others receive waters by seepage and springs, sometimes from areas far beyond their surface watershed. Many unique species are associated with Ozark streams, springs, caves, fens, and cliffs.

Differences in landform, lithology, soils, and vegetation produce eleven Landtype Association Types (LTA Types) in Missouri (see map on next page). The LTA Types include high, slightly dissected prairie plains; rolling to hilly landscapes with savanna and woodlands as a principle feature; forested hills and breaks associated with the major drainage basins (Osage, Gasconade, Meramec, Current, Elk, St Francis, and Black); igneous glade/woodland knobs and dolomite glade/woodland hills; and the alluvial plains of the larger rivers.

Each LTA Type has a distinctive set of attributes, giving it a particular set of conservation challenges and opportunities. Forest and woodland management opportunities, as well as associated communities and species vary by each type. The following descriptions outline these differences.



Ozark Highlands LTA Types and MDC Lands

- OZ Alluvial Plains
- OZ Dolomite Glade/Woodlands
- OZ Igneous Knobs
- OZ Oak Savanna/Woodland (Dissected) Plains
- OZ Oak Woodland Dissected Plains & Hills
- OZ Oak Woodland/Forest Hills
- OZ Oak-Pine Hills
- OZ Pine-Oak Woodland Dissected Plain
- OZ Prairie Plains
- OZ Prairie/Savanna (Dissected) Plains
- OZ Rugged Hills & Forest Breaks
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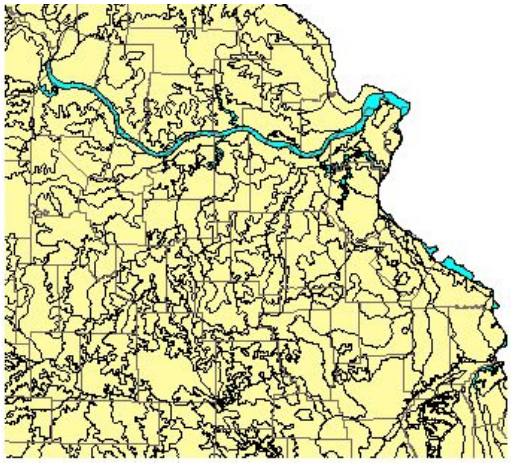
OZARK ALLUVIAL PLAINS LTAs



CHARACTERISTICS: Confined to the broad alluvial plains of the Missouri and Mississippi rivers and lower tributary reaches within the Ozarks. These reaches on the big rivers are narrower, higher gradient and historically more forested than upstream within the Till Plains Ecological Section. Floodplains of tributaries are at least 1 mile wide to be delineated as an LTA. Rivers have a variety of alluvial substrates, but often sandy or loamy materials. Historically, these landscapes were dominated by riverfront bottomland forest types, with mixed hardwood bottomland forests on higher terraces. The rivers had more meanders, side channels, islands and wetlands than currently. Today, the rivers are largely channelized and their floodplains cleared for cropland. Frequent sand bars and occasional wetlands or bottomland forests occur.

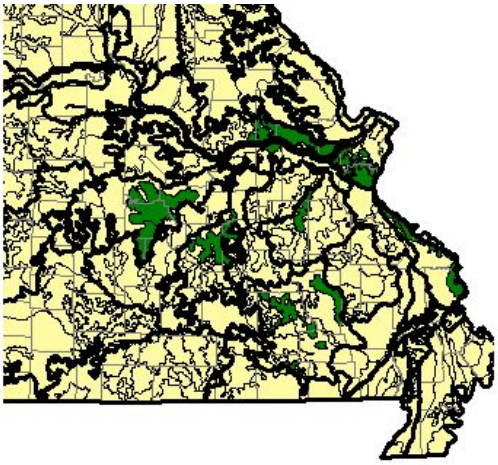
MANAGEMENT ISSUES AND OPPORTUNITIES:

- Size: 492,811 acres. Conservation lands: 45,000 acres (9%), concentrated in central Missouri along the Missouri River. Most owned by MDC, but USFWS owns over 7,500 acres. Prominent conservation lands include Franklin Island, Overton Bottoms, Marion Bottoms, Howell Island, Pelican Island, Columbia Bottoms, Eagle Bluffs and Marais Temps Clair Conservation Areas (MDC), and Big Muddy National Fish and Wildlife Refuge (USFWS), as well as USACOE mitigation sites. Lands along the Mississippi R. include Red Rock, Seventy-Six and Apple Creek CAs.
- The dynamic nature of the river ecosystems has been largely controlled for navigation and agriculture, however, recent acquisition of flood-damaged land has increased the opportunity to return parts of the floodplains to the rivers. Water management from upstream reservoirs is an influential issue. Consideration of the effects of altered hydrology on habitat management choices is an important issue.
- Bottomland forests, wetlands and diverse aquatic habitats are very limited in extent. Reforestation and wetland restoration can help mitigate flood damage.
- Water quality is threatened by stormwater, sewage and agricultural runoff, and habitat is altered by channelization and navigation structures. Urbanization of the floodplain is also an important issue.
- Bottomland forest restoration could supply products from thinning and harvest activities, often on exceptionally productive land. Waterfowl and other hunting opportunities may also prove economically valuable and promote conservation. The wetland Reserve program can help support these activities.
- Public lands along the river exhibit high public use. Interpretation and promotion of recreation on the river can garner support for alternative conservation measures.

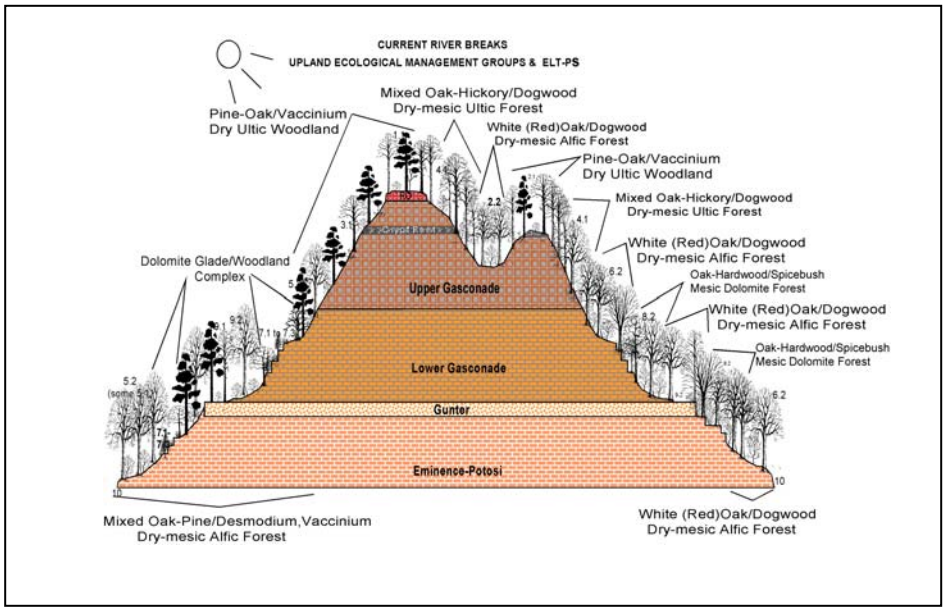
OZARK ALLUVIAL PLAINS LTAs

Landscapes, Communities and Species worthy of special consideration in this LTA Type include:		
Landscapes	1000+ acre Bottomland Forest/Wetland/ Riverine Complexes	
Natural Communities	Mixed Hardwood Mesic Bottomland Forest	
	Riverfront Forest	
	Wet & Wet-mesic Bottomland Forest	
	Freshwater Marsh	
	Sandbar/Mudflat	
Habitats	Riverine Sandflats	
	Ephemeral Wetlands	
Plants and Animals (**Bold** = Species of Conservation Concern. Other species are highly dependent on this system)	Forest	**Cerulean Warbler (*Dendroica cerulea*)**
		Yellow-throated Warbler (*Dendroica dominica*)
		Pileated Woodpecker (*Dryocopus pileatus*)
		Acadian Flycatcher (*Empidonax virescens*)
		Prothonotary Warbler (*Protonotaria citrea*)
	Wetlands	**Bergia (*Bergia texana*)**
		Decurrent False Aster (*Boltonia decurrens*)
		Great Plains Toad (*Bufo cognatus*)
		Plains Spadefoot (*Spea bombifrons*)
		American Bittern (*Botaurus lentiginosus*)
		Marsh Wren (*Cistothorus palustris*)
		Little Blue Heron (*Egretta caerulea*)
		Rusty Blackbird (*Euphagus carolinus*)
		Least Bittern (*Ixobrychus exilis*)
		Black-crowned Night Heron (*Nycticorax nycticorax*)
		Sora (*Porzana carolina*)
		Virginia Rail (*Rallus limicola*)
		King Rail (*Rallus elegans*)

OZARK FORESTED RUGGED HILLS AND BREAKS LTAs



CHARACTERISTICS: These exceptionally steep and rugged lands are associated with many river valleys. Local relief is 250 to 450 feet, with narrow ridges, steep sideslopes and narrow, sinuous valleys. Historically, the most densely wooded landscapes in the region. These landscapes are associated with a variety of parent materials (including loess, limestone, sandstone and cherty residuum), soils and forest/woodland types. Outstanding spring-fed perennial creeks and small rivers have gravel beds and deeply incised valleys. Today, these areas are still largely timbered with high habitat diversity including numerous woodland and forest types, glades, fens, cliffs, caves, springs and outstanding streams.



MANAGEMENT ISSUES AND OPPORTUNITIES:

- Size: 1,914,000 acres. Conservation lands: almost 300,000 acres (15%= outstanding opportunities to manage at a landscape scale). USFS and MDC own approximately 100,000 acres each. Prominent conservation lands include: Weldon Spring, Huzzah, Daniel Boone, and parts of Sunklands, Current River, Angeline, Rocky Creek , Lead Mine, Litle Lost Creek and Meramec Conservation Areas (MDC); Ha Ha Tonka, Lake of the Ozarks, Graham Cave, Babler, Trail of Tears, and parts of Bennet Springs, Meramec and Montauk State Parks (DNR); Mark Twain National Forest (USFS), Ozark National Scenic Riverways (NPS), Clearwater Lake (COE), and Chilton Creek Preserve (TNC).
- Along with the adjacent Hills LTAs, these landscapes contain some of the largest blocks of contiguous forest in the lower Midwest, consequently, very important for forest interior species. Fragmentation is a long term threat.
- Many productive woodland and forest types can provide for a variety of habitat structure. Forest management is limited by steepness of the terrain.
- Bottomland forests, as well as flat ridgetops are often cleared for agriculture.
- Glades, fens, cliffs, caves, springs and outstanding streams are imbedded in the forest matrix. Many require conservation actions including prescribed fire or protection from adverse site-disturbing activities.
- Streams are impacted by riparian forest clearing, intensive livestock grazing and in-stream gravel mining. Recrteational activities (ie. horseback riding and ATVs) can also have adverse impacts to streams.
- Excellent potential for deriving a variety of high quality hardwood timber products.
- Outstanding scenery and streams draw outdoor recreationists, especially to the minimally developed and rugged terrain uncommon in other parts of the Midwest.

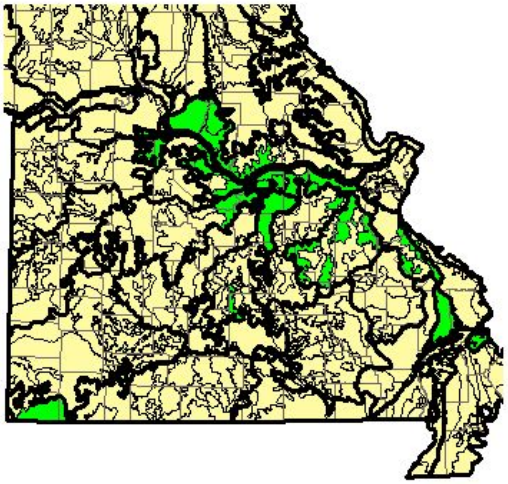
OZARK FORESTED RUGGED HILLS AND BREAKS LTAs

Landscapes, Communities and Species worthy of special consideration in this LTA Type include:		
Landscapes	10,000+ acre Forested Core in 85,000+ acre Forested Landscapes with Glade, Fen, Cliff, Cave and Spring inclusions	
Natural Communities		
	Mixed Oak-Hickory, White Oak, and Pine-Oak Dry-mesic Chert and Sandstone Forests	
	White Oak Dry-mesic Limestone/Dolomite Forest	
	Mixed Oak-Hickory and White Oak Dry-mesic Loess/Glacial Till Forests	
	Oak-Mixed Hardwood Mesic Limestone/Dolomite Forest	
	Oak-Mixed Hardwood Mesic Loess/Glacial Till Forest	
	White Oak/Dogwood Dry-mesic Bottomland Forest	
	Mixed Hardwood Mesic Bottomland Forest	
	Riverfront Forest	
	Post Oak, Mixed Oak and Pine-Oak Chert and Sandstone Woodlands	
	Limestone/Dolomite Woodlands	
	Other Important Natural Communities: Dolomite Glade, Limestone Glade, Sandstone Glade, Dry Limestone/Dolomite Cliff, Dry Sandstone Cliff, Moist Limestone/Dolomite Cliff, Moist Sandstone Cliff, Ozark Fen, Caves	
Habitats	Cane Breaks	
Plants and Animals (**Bold** = Species of Conservation Concern. Other species are highly dependent on this system)	Forest	**Wood Anemone (*Anemone quinquefolia*)**
		Willidenow's Sedge (*Carex willdenowii*)
		Goldie's Fern (*Dryopteris goldiana*)
		Virginia Pennywort (*Obolaria virginica*)
		Running Buffalo Clover (*Trifolium stoloniferum*)
		Ringed Salamander (*Ambystoma annulatum*)
		Long-tailed Salamander (*Eurycea longicauda*)
		Dark-sided Salamander (*Eurycea longicauda melanopleura*)
		Four-toed Salamander (*Hemidactylium scutatum*)
		Ozark Zigzag Salamander (*Plethodon dorsalis angusticlavius*)
		Wood Frog (*Rana sylvatica*)
		Yellow-billed Cuckoo (*Coccyzus americanus*)
		Cerulean Warbler (*Dendroica cerulea*)
		Yellow-throated Warbler (*Dendroica dominica*)
		Pileated Woodpecker (*Dryocopus pileatus*)

Landscapes, Communities and Species worthy of special consideration in this LTA Type include:		
		Acadian Flycatcher (*Empidonax virescens*)
		Worm-eating Warbler (*Helmitheros vermivorus*)
		Wood Thrush (*Hylocichla mustelina*)
		Swainson's Warbler (*Limnothlypis swainsonii*)
		Kentucky Warbler (*Oporornis formosus*)
		Carolina Chickadee (*Parus carolinensis*)
		Prothonotary Warbler (*Protonotaria citrea*)
		Ovenbird (*Seiurus aurocapillus*)
		Louisiana Waterthrush (*Seiurus motacilla*)
		Golden Mouse (*Ochrotomys nuttalli*)
	Woodland	**Tall Larkspur (*Delphinium exaltatum*)**
		A Blazing Star (*Liatris scariosa var. nieuwlandii*)
		Whip-poor-will (*Caprimulgus vociferus*)
		Chuck-will's-widow (*Caprimulgus carolinensis*)
		Great Crested Flycatcher (*Myiarchus crinitus*)
		Orchard Oriole (*Icterus spurius*)
		Summer Tanager (*Piranga rubra*)
	Glades/ Cliffs	**Forked Aster (*Aster furcatus*)**
		American Barberry (*Berberis canadensis*)
		Harebell (*Campanula rotundifolia*)
		Showy Lady-slipper (*Cypripedium reginae*)
		Northern Bedstraw (*Galium boreale ssp. septentrionale*)
		Sullivantia (*Sullivantia sullivantii*)
		False Bugbane (*Trautvetteria caroliniensis*)
		White Camas (*Zigadenus elegans*)
		Eastern Collared Lizard (*Crotaphytus collaris collaris*)
	Fens	**Small White Lady-slipper (*Cypripedium candidum*)**
		Loesel's Twayblade (*Liparis loeselii*)
		Hine's Emerald Dragonfly(*Somatochlora hineana*)
		Gray Petaltail (*Tachopteryx thoreyi*)
	Caves	**Hubricht's Long-tailed Amphipod (*Allocrangonyx hubrichti*)**
		Salem Cave Crayfish (*Cambarus hubrichti*)
		Onondaga Cave Amphipod (*Stygobromus onondagaensis*)
		Grotto Sculpin (*Cottus sp.)*
		Southern Cavefish (*Typhlichthys subterraneus*)
		Cave Salamander (*Eurycea lucifuga*)

Landscapes, Communities and Species worthy of special consideration in this LTA Type include:		
		Grotto Salamander (*Typhlotriton spelaeus*)
		Gray Bat (*Myotis grisescens*)
		Eastern Small-footed Myotis (*Myotis leibii*)
		Northern Myotis (*Myotis septentrionalis*)
		Indiana Bat (*Myotis sodalis*)

OZARK OAK WOODLAND/FOREST HILLS LTAs



CHARACTERISTICS: A variety of hilly, historically forested landscapes associated with stream valleys outside the principle range of shortleaf pine in the Ozarks. Not as steep as the Rugged Hills and Breaks, but with up to 250 feet of local relief. A variety of geologic parent materials and soils is represented (including glacial influences on the northwest units); however, these LTAs share strongly rolling topography and historic dominance of oak woodland and forest in common. Pine-oak woodlands have notable occurrence in the Elk River and upper Meramec Hills. Streams are mainly perennial creeks and small rivers with gravel bed channels. Today, most of these landscapes have substantial clearing of uplands and valleys for pasture, but substantial blocks of forest remain. Karst areas are common, and dolomite or limestone glades and cliffs are scattered.

MANAGEMENT ISSUES AND OPPORTUNITIES:

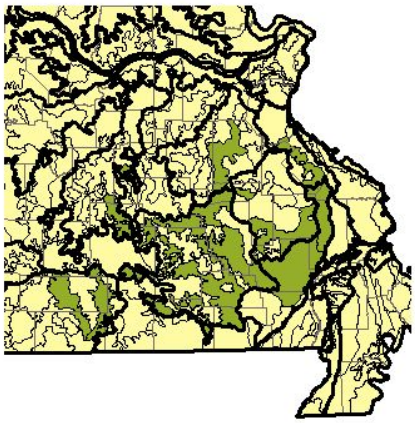
- These landscapes encompass over 3 million acres. Conservation lands comprise over 115,000 acres (4% of the area). Much of the conservation lands are on the Mark Twain National Forest, but MDC owns over 59,000 acres. Prominent conservation areas include Woodson K. Woods, Flag Spring, Rudolph Bennitt, Davisdale, Indian Trail, Huzzah, and Pea Ridge Conservation Areas (MDC); Washington, St. François, Rock Bridge and Hawn State Parks (DNR).
- While some of these LTAs contain large contiguous patches of forest, most have been substantially fragmented into smaller patches.
- Much of the forested acreage is mature, with limited structural or compositional diversity. Substantial opportunity to restore a variety of mixed oak, white oak and mixed hardwood forest communities exists. Bottomland forests and ridgetops are largely cleared and restoration opportunity is widespread. The Conservation Reserve Enhancement Program may be applicable in these situations.
- Some oak decline problems and pine-oak woodland restoration opportunity exists in upper Meramec and elk River Hills.
- Many streams with outstanding fauna are threatened by poor riparian corridors, agricultural runoff and in-stream disturbances (gravel mining, road crossings, livestock). Recreational impacts (ie. ATVs, horseback riding) can also have adverse impacts.
- Dolomite glades are often heavily overgrown with red cedar.
- Forest management could supply products, often on exceptionally productive land. Cedar products from glade restoration are potentially abundant.
- Limited public land means private land owner voluntary cooperation is necessary for conservation activities.

OZARK OAK WOODLAND/FOREST HILLS LTAs

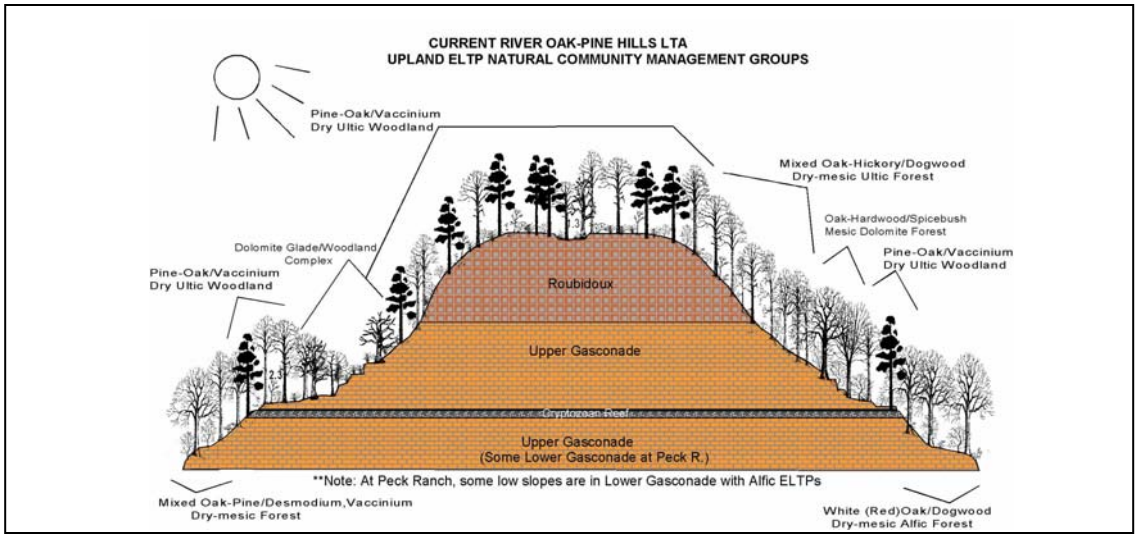
Landscapes, Communities and Species worthy of special consideration in this LTA Type include:		
Landscapes	10,000+ acre Forested Core in 85,000+ acre Forested Landscapes with Glade, Fen, and Cliff inclusions. Consider connectivity to adjacent forest blocks.	
Natural Communities	Mixed Oak and White Oak Dry-Mesic Chert, Limestone/Dolomite and Loess/Glacial Till Forests	
	Mixed Hardwood Mesic Bottomland Forest	
	Riverfront Forest	
	Post Oak and Mixed Oak Dry Chert Woodlands	
	Dry Limestone/Dolomite Woodland	
	Mixed Oak Dry Loess/Glacial Till Woodland	
	White Oak-Black Oak Dry-Mesic Chert Woodland	
	Other Important Communities Include: Dolomite Glade, Limestone Glade, Dry Limestone/Dolomite Cliff, Ozark Fen, Saline Seep, Caves	
Habitats	Cane Breaks	
Plants and Animals (**Bold** = Species of Conservation Concern. Other species are highly dependent on this system)	Forest	**A Brome (*Bromus latiglumis*)**
		Beech Drops (*Epifagus virginiana*)
		Large Whorled Pagonia (*Isotria verticillata*)
		Wood Frog (*Rana sylvatica*)
		Yellow-billed Cuckoo (*Coccyzus americanus*)
		Cerulean Warbler (*Dendroica cerulea*)
		Yellow-throated Warbler (*Dendroica dominica*)
		Pileated Woodpecker (*Dryocopus pileatus*)
		Acadian Flycatcher (*Empidonax virescens*)
		Worm-eating Warbler (*Helmitheros vermivorus*)
		Wood Thrush (*Hylocichla mustelina*)
		Swainson's Warbler (*Limnothlypis swainsonii*)
		Carolina Chickadee (*Parus carolinensis*)
		Prothonotary Warbler (*Protonotaria citrea*)
		Kentucky Warbler (*Oporornis formosus*)
		Louisiana Waterthrush (*Seiurus motacilla*)
		Ovenbird (*Seiurus aurocapillus*)
	Woodland	Chuck-will's-widow (*Caprimulgus carolinensis*)
		Whip-poor-will (*Caprimulgus vociferus*)
		Orchard Oriole (*Icterus spurius*)
		Great Crested Flycatcher (*Myiarchus crinitus*)

Landscapes, Communities and Species worthy of special consideration in this LTA Type include:		
		Summer Tanager (*Piranga rubra*)
	Glades/ Cliffs	**Alabama Lip-fern (*Cheilanthes alabamensis*)**
		Woolly Lip-fern (*Cheilanthes tomentosa*)
		Fremont's Leather Flower (*Clematis fremontii*)
		A Bladderfern (*Cystopteris tenuis*)
		Virginia Whitlow Wort (*Paronychia virginica var. scoparia*)
		Missouri Cliffbrake (*Pellaea glabella var. missouriensis*)
		Bifid Phlox (*Phlox bifida ssp. stellaria*)
		Soapberry (*Sapindus drummondii*)
		A Moss (*Syrrhopodon texanus*)
		Ozark Corn Salad (*Valerianella ozarkana*)
		Eastern Collared Lizard (*Crotaphytus collaris collaris*)
	Wetlands	**Saline Spring Tiger Beetle (*Cicindela circumpicta johnsonii*)**
		Gray Petaltail (*Tachopteryx thoreyi*)
		Great Plains Toad (*Bufo cognatus*)
		Plains Spadefoot (*Spea bombifrons*)
	Caves	**Pink Planarian (*Macrocotyla glandulosa*)**
		Bristly Cave Crayfish (*Cambarus setosus*)
		Cave Salamander (*Eurycea lucifuga*)
		Gray Bat (*Myotis grisescens*)
		Indiana Bat (*Myotis sodalis*)
		Spring Cavefish (Forbesichthys agassizi) on Benton Hills

OZARK OAK-PINE WOODLAND/FOREST HILLS LTAs



CHARACTERISTICS: The hilly lands associated with stream valleys within the range of shortleaf pine in the southeastern Ozarks. Not as steep as the Breaks, but with up to 250 feet of local relief. Broad ridges in the Roubidoux formation give way to moderately steep sideslopes and relatively broad valleys in the Gasconade formation. Streams include both intermittent and perennial creeks and rivers with gravel bed channels. Historically and currently timbered in oak-pine and mixed oak woodland and forest. Valleys are often cleared pasture. These landscapes offer a good opportunity to manage for a variety of forest and woodland communities. Glades, sinkhole ponds, caves, and fens are scattered throughout these areas.



MANAGEMENT ISSUES AND OPPORTUNITIES:

- These landscapes encompass over 2,830,000 acres. Conservation lands comprise nearly 850,000 acres (30% of the area). Consequently, substantial opportunity to conserve these ecosystems at a landscape scale exists. Most of the conservation lands are within Mark Twain National Forest (USFS), MDC owns almost 150,000 acres. Prominent conservation lands include Peck Ranch, Sunklands, Angeline, Rocky Creek, Birch Creek, University Forest, Castor River, Coldwater and Pea Ridge Conservation Areas (MDC); Grasshopper Hollow (TNC), and portions of Hawn State Park (DNR).
- These landscapes are the center of some of the largest contiguous patches of forest in the Midwest. Along with adjacent Breaks and Dissected Plains landscapes, they are very important for forest interior birds and other wildlife.
- Much of the forested acreage is mature, even-aged, mixed oak forest with a diminished pine component. Oak decline on former pine sites is common. Opportunities to maintain and restore oak-pine and mixed oak woodland and forest communities exist. Many open bottomlands and ridges are currently cleared and might be reforested. While public forest land is often mature, private lands exhibit more harvest and immaturity.
- Dolomite glades, fens, sinkhole ponds, cave and cliff communities are scattered throughout.
- Outstanding spring-fed creeks and rivers may be threatened by gravel mining, intensive livestock grazing and cleared corridors. Recreational activities (ie. ATVs and horseback riding) can also have adverse impacts.
- Excellent potential for deriving a variety of high quality hardwood timber products exists.
- A wide variety of interpretation and recreation activities are available, especially in association with the rivers.

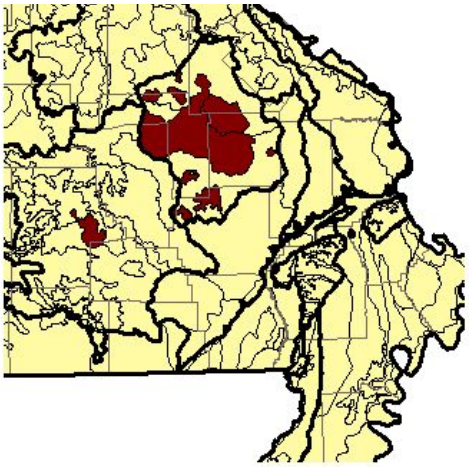
OZARK OAK-PINE WOODLAND/FOREST HILLS LTAs

Landscapes, Communities and Species worthy of special consideration in this LTA Type include:		
Landscapes	10,000+ acre Pine-Oak and Oak Woodland and Forest Core in 85,000+ acre Forested Landscapes with Glade, Fen, Cliff, Sinkhole Pond and Cave inclusions. Consider connectivity with adjacent forested landscapes.	
Natural Communities		
	Pine-Oak, Mixed Oak, White Oak Dry-Mesic Chert and Sandstone Forest	
	Chinquapin Oak, White Oak, Red Oak Dry-mesic Limestone/Dolomite Woodland	
	Mixed Hardwood Mesic Limestone/Dolomite Forest	
	Mixed Hardwood Mesic Bottomland Forest	
	Riverfront Forest	
	White Oak/Dogwood Dry-Mesic Bottomland Forest	
	Pine Oak and Mixed Oak Chert and Sandstone Woodlands	
	Chinquapin Oak-Ash (Red Cedar) Dry Dolomite Woodland	
	Other Important Natural Communities Include: Dolomite Glade, Dry Limestone/Dolomite Cliff, Moist Limestone/Dolomite Cliff, Moist Sandstone Cliff, Forested Fen, Ozark Fen, Prairie Fen, Pond Marsh, Pond Shrub Swamp, Pond Swamp, Caves	
Habitats	Cane Breaks	
Plants and Animals (**Bold** = Species of Conservation Concern. Other species are highly dependent on this system)	Forest	**A Sedge (*Carex molestiformis*)**
		American Beakgrain (*Diarrhena americana*)
		Marsh Pink (*Sabatia brachiata*)
		Cranefly Orchid (*Tipularia discolor*)
		Marsh St. John's Wort (*Triadenum tubulosum*)
		Smooth White Violet (*Viola macloskeyi ssp. pallens*)
		Ringed Salamander (*Ambystoma annulatum*)
		Long-tailed Salamander (*Eurycea longicauda*)
		Four-toed Salamander (*Hemidactylium scutatum*)
		Yellow-billed Cuckoo (*Coccyzus americanus*)
		Cerulean Warbler (*Dendroica cerulea*)
		Yellow-throated Warbler (*Dendroica dominca*)
		Pileated Woodpecker (*Dryocopus pileatus*)
		Acadian Flycatcher (*Empidonax virescens*)
		Worm-eating Warbler (*Helmitheros vermivorus*)
		Wood Thrush (*Hylocichla mustelina*)
		Swainson's Warbler (*Limnothlypis swainsonii*)
		Kentucky Warbler (*Oporornis formosus*)
		Carolina Chickadee (*Parus carolinensis*)

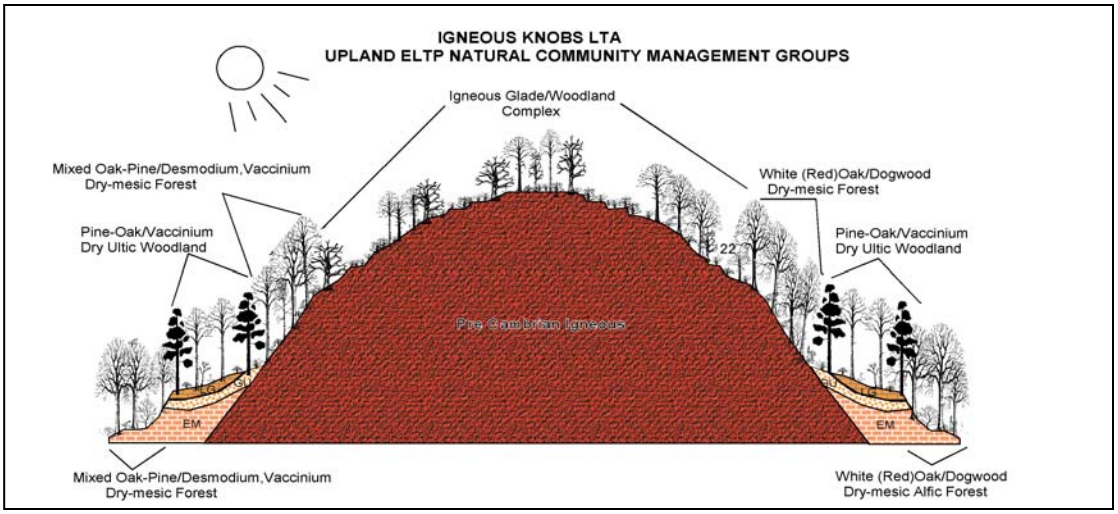
Landscapes, Communities and Species worthy of special consideration in this LTA Type include:		
		Ovenbird (*Seiurus aurocapillus*)
		Louisiana Waterthrush (*Seiurus motacilla*)
		Prothonotary Warbler (*Protonotaria citrea*)
		Golden Mouse (*Ochrotomys nuttalli*)
		Swamp Rabbit (*Sylvilagus aquaticus*)
	Woodland	**Big-leaved Aster (*Aster macrophyllus*)**
		Barren Strawberry (*Waldsteinia fragarioides ssp. fragarioides*)
		Buck Moth (*Hemileuca maia*)
		Bachman's Sparrow (*Aimophila aestivalis*)
		Chuck-will's-widow (*Caprimulgus carolinensis*)
		Whip-poor-will (*Caprimulgus vociferus*)
		Pine Warbler (*Dendroica pinus*)
		Orchard Oriole (*Icterus spurius*)
		Great Crested Flycatcher (*Myiarchus crinitus*)
		Summer Tanager (*Piranga rubra*)
		Plains Spotted Skunk (*Spilogate putorius interrupta*)
	Glades/ Cliffs	**Ciliate Blue Star (*Amsonia cilata var. filifolia*)**
		Forked Aster (*Aster furcatus*)
		Oferhollow Reed Grass (*Calamagrostis porteri ssp. insperata*)
		A Leatherflower (*Clematis viorna*)
		Showy Lady-slipper (*Cypripedium reginae*)
		Hay-scented Fern (*Dennstaedtia punctilobula*)
		French's Shooting Star (*Dodecatheon frenchii*)
		Round-branched Ground Pine (*Lycopodium dendroideum*)
		Ground Cedar (*Lycopodium tristachyum*)
		Sullivantia (*Sullivantia sullivantii*)
		A Moss (*Syrhopodon texanus*)
		Arkansas Yucca (*Yucca arkansana*)
		White Camas (*Zigadenus elegans*)
	Fens and Sinkhole Ponds	**Marsh Bellflower (*Campanula aparinoides*)**
		A Sedge (*Carex bromoides*)
		Epiphytic Sedge (*Carex decomposita*)
		A Sedge (*Carex sterilis*)
		Straw Sedge (*Carex straminea*)
		Tussock Sedge (*Carex stricta*)
		Hairy-fruited Sedge (*Carex trichocarpa*)
		Small White Lady-slipper (*Cypripedium candidum*)
		Swamp Loosestrife (*Decodon verticillatus*)

Landscapes, Communities and Species worthy of special consideration in this LTA Type include:		
		Log Fern (*Dryopteris celsa*)
		Queen of the Prairie (*Filipendula rubra*)
		Sharp-scaled Manna Grass (*Glyceria acutiflora*)
		A Moss (*Helodium paludosum*)
		Featherfoil (*Hottonia inflata*)
		Englemann's Quillwort (*Isoetes engelmannii var. engelmannii*)
		Canada Rush (*Juncus canadensis var. canadensis*)
		Loesel's Twayblade (*Liparis loeselii*)
		Wild Sweet William (*Phlox maculate ssp. pyramidalis*)
		Green Wood Orchid (*Platanthera clavellata*)
		Spotted Pondweed (*Potamogeton pulcher*)
		Canby's Bulrush (*Schoenoplectus etuberculatus*)
		Weakstalk Bulrush (*Schoenoplectus purshianus*)
		Hine's Emerald (*Somatochlora hineana*)
		Gray Petaltail (*Tachopteryx thoreyi*)
	Caves	**Hubricht's Long-tailed Amphipod (*Allocrangonyx hubrichti*)**
		Onondaga Cave Amphipod (*Stygobromus onodagaensis*)
		Salem Cave Crayfish (*Cambarus hubrichti*)
		Southern Cavefish (*Typhlichthys subterraneus*)
		Cave Salamander (*Eurycea lucifuga*)
		Grotto Salamander (*Typhlotriton spelaeus*)
		Gray Bat (*Myotis grisescens*)
		Northern Myotis (*Myotis septentrionalis*)
		Indiana Bat (*Myotis sodalis*)

OZARK IGNEOUS KNOBS LTAs



CHARACTERISTICS: The only igneous landscapes in Missouri, these LTAs are associated with the rugged and prominent knobs of the St. Francis Mountains and a cluster of knobs in the center of the Current River valley. Historically, a complex mosaic of communities existed with knob tops encircled by igneous glade/woodland complexes, lower slopes and valleys in oak-pine and mixed oak forest. Streams are often high gradient with a bedrock or gravel base and frequent shut-ins. The knobs are often connected by timber covered sedimentary hills. Today, these rugged LTAs are minimally developed. Glades and woodlands are overgrown in the absence of fire, and forest composition and structure is somewhat homogenized by past management. Great opportunities exist for glade/woodland restoration, community diversity and dispersed-wildland recreation.



MANAGEMENT ISSUES AND OPPORTUNITIES:

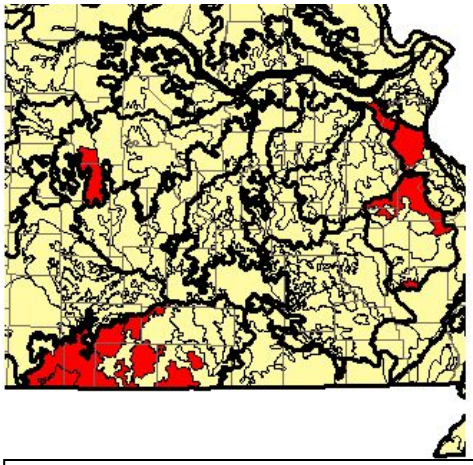
- Size: 475,000 acres. Conservation lands: over 110,000 acres (24%), high potential for conservation at a landscape scale. Most owned by USFS (Mark Twain National Forest – Fredricktown and Potosi districts), also Elephant Rocks, Johnson's Shut-ins, Taum Sauk Mountain and Sam A. Baker State Parks (DNR-15,000), Ozark National Scenic Riverways (NPS - 8,000), Buford Mountain, Ketcherside Mountain, Graves Mountain, Amidon, and parts of Peck Ranch, Angeline and Rocky Creek Conservation Areas (MDC >28,000); Shut-in Mountain Fens and Thorny Mountain Preserve (TNC)
- These landscapes contain some of the most rugged, wild and forested lands in the Ozarks. Along with adjacent breaks and hills landscapes, they are very important for forest interior birds and other wildlife. Maintenance of existing connectivity with adjacent forested landscapes is important.
- The unique igneous glade/woodland complexes are often overgrown with sumac, hickory, oak and cedar, but have shown an exceptional recovery after the use of prescribed fire.
- Much is mature, even-aged, mixed oak forest with limited compositional and structural diversity resulting from past management. Opportunities to maintain and restore oak-pine and mixed oak woodland and forest communities exist.
- Stream communities, with many rare and endemic animals, are threatened by in-stream alterations, intensive livestock grazing and agricultural runoff. Recreational activities (ie. ATVs and horseback riding) can have adverse impacts.
- Feral hogs have a detrimental impact within these landscapes. In addition, illegal collection og reptiles from the glade systems can have significant impact.
- Glade, woodland and forest management could supply a variety of forest products.
- Remote character and the abundance of public lands offer outstanding scenic views and wildland recreation.

OZARK IGNEOUS KNOBS LTAs

Landscapes, Communities and Species worthy of special consideration in this LTA Type include:		
Landscapes	1000+ acre Glade/Woodland/Forest Complexes. Consider connectivity with adjacent forested and wildland landscapes.	
Natural Communities	White Oak/Dogwood Dry-mesic Bottomland Forest	
	Riverfront Forest	
	Mixed Hardwood Mesic Bottomland Forest	
	Mixed Oak-Hickory and White Oak Dry-mesic Igneous Forests	
	Post Oak, Mixed Oak and Pine-Oak Igneous Woodlands	
	Igneous Glade	
	Igneous Cliff	
	Gravel Wash	
	Ozark Fen	
Habitats		
Plants and Animals (**Bold** = Species of Conservation Concern. Other species are highly dependent on this system)	Forest	**Winterberry (*Ilex verticillata var. padifolia*)**
		Long-tailed Salamander (*Eurycea longicauda*)
		Dark-sided Salamander (*Eurycea longicauda melanopleura*)
		Four-toed Salamander (*Hemidactylium scutatum*)
		Yellow-billed Cuckoo (*Coccyzus americanus*)
		Worm-eating Warbler (*Helmitheros vermivorus*)
		Wood Thrush (*Hylocichla mustelina*)
		Kentucky Warbler (*Oporornis formosus*)
		Carolina Chickadee (*Parus carolinensis*)
		Ovenbird (*Seiurus aurocapillus*)
		Louisiana Waterthrush (*Seiurus motacilla*)
	Woodland	Whip-poor-will (*Caprimulgus vociferus*)
		Chuck-will's-widow (*Caprimulgus carolinensis*)
		Orchard Oriole (*Icterus spurius*)
		Great Crested Flycatcher (*Myiarchus crinitus*)
		Summer Tanager (*Piranga rubra*)
		Plains Spotted Skunk (*Spilogate putorius interrupta*)
	Glades/ Cliffs	**Mead's Milkweed (*Asclepias meadii*)**
		Eastern Collared Lizard (*Crotaphytus collaris collaris*)
	Fens	**Grass Pink Orchid (*Calopogon tuberosus*)**

Landscapes, Communities and Species worthy of special consideration in this LTA Type include:		
		Snake-mouth Orchid (*Pogonia ophioglossoides*)
		Slender Bladderwort (*Urticularia subulata*)
		Northern Arrow-wood (*Viburnum recognitum*)
	Caves	**Gray Bat (*Myotis grisescens*)**
		Eastern Small-footed Myotis (*Myotis leibii*)
		Indiana Bat (*Myotis sodalis*)

OZARK DOLOMITE GLADE/WOODLAND LTAs



CHARACTERISTICS: A variety of landscapes all of which have a prominent component of shallow soiled dolomite glade and oak woodland communities. This includes dolomite knobs and breaks in the White River Hills, the Pomme de Terre Hills, the Jefferson County glade region, and the basins of the St. Francis Mountains. More isolated barrens of Perry and St. Genevieve counties are not included here. Historically, glade/woodland complexes were common and interspersed within an otherwise forested landscape. The glades supported many rare and endemic species. Mixed oak and mixed hardwood forests occupied low slopes and valleys. Streams are variable, but often have a bedrock base. Today, many of the glade/woodland complexes are overgrown in the absence of fire, but show excellent restoration potential.

MANAGEMENT ISSUES AND OPPORTUNITIES:

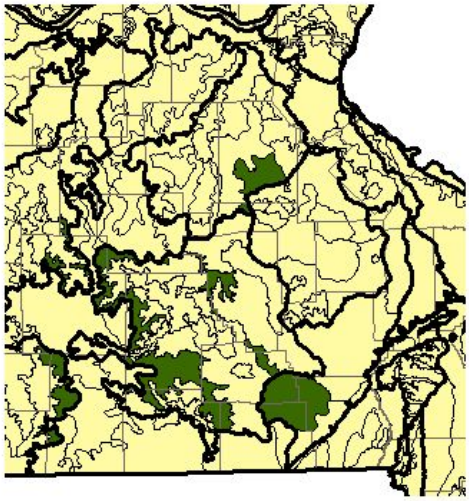
- Size: 1,710,000 acres. Conservation lands: over 350,000 acres (21%), offering outstanding opportunities to conserve these ecosystems at a landscape scale. Most conservation lands are on the Mark Twain National Forest Ava and Cassville districts (USFS); additional 135,000 acres occurs on US Army Corps of Engineers lands (Table Rock, Bull Shoals, Harry S. Truman and Wappapello Reservoirs), MDC owns or leases over 20,000 acres including Caney Mountain, Henning, Busiek, Valley View and parts of Drury-Mincy CAs (MDC), other conservation lands include Roaring River, Table Rock, Robertsville and St. Joe State Parks (DNR), and Victoria Glade (TNC, MDC).
- Dolomite glades and woodlands harbor numerous unique and endemic species. Most suffer heavy invasion of red cedar and other woody species, many are overgrazed. Prescribed fire management has shown outstanding restoration potential. Conflicts with human development may emerge.
- Outstanding streams support a wide variety of rare and unique species, though some are impacted by degradation from gravel mining, grazing and other disturbances. Recreational activities (ie. ATVs and horseback riding) can have adverse impacts on streams.
- Restoration and management could create eastern redcedar and oak timber as by products of management. Grazing of native forage on fragile glade soils needs to be done with care.
- Opportunities exist to manage several adjacent forest communities and create a complex mosaic of habitats.
- The varied landscapes offer scenic value and many recreational opportunities.

OZARK DOLOMITE GLADE/WOODLAND LTAs

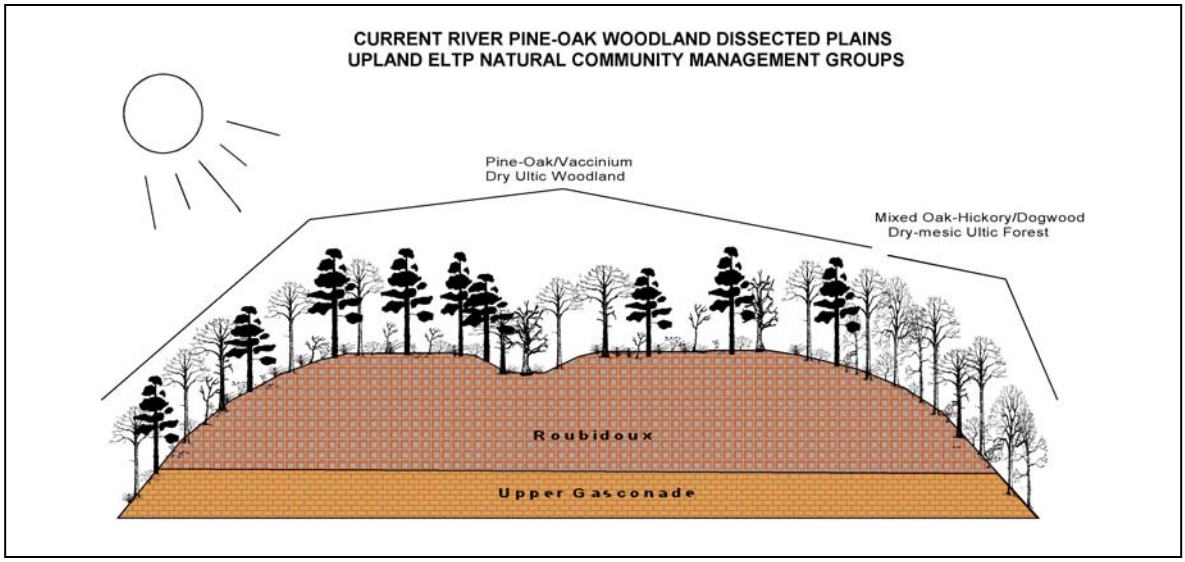
Landscapes, Communities and Species worthy of special consideration in this LTA Type include:		
Landscapes	500+ acre Glade/Woodland Complexes	
Natural Communities	Post Oak Dry Chert Woodland	
	Mixed Oak Dry-mesic Chert Woodland	
	Dry Limestone/Dolomite Woodland	
	Dry-mesic Limestone/Dolomite Woodland	
	Dolomite Glade	
	Pine-Oak, Mixed Oak, White Oak Dry-Mesic Chert Forest	
	Mixed Hardwood Mesic Limestone/Dolomite Forest	
	Mixed Hardwood Mesic Bottomland Forest	
	Riverfront Forest	
	White Oak/Dogwood Dry-Mesic Bottomland Forest	
	Caves	
Habitats		
Plants and Animals (**Bold** = Species of Conservation Concern. Other species are highly dependent on this system)	Forest	**Ozark Chinquapin (*Castanea pumila var. ozarkensis*)**
		Ringed Salamander (*Ambystoma annulatum*)
	Woodland	Whip-poor-will (*Caprimulgus vociferus*)
		Chuck-will's-widow (*Caprimulgus carolinensis*)
		Orchard Oriole (*Icterus spurius*)
		Great Crested Flycatcher (*Myiarchus crinitus*)
		Summer Tanager (*Piranga rubra*)
	Savanna	**Bachman's Sparrow (*Aimophila aestivalis*)**
	Glades/ Cliffs	**Pale Gerardia (*Agalinis skinneriana*)**
		Bush's Poppy Mallow (*Callirhoe bushii*)
		Marine Vine (*Cissus incisa*)
		Fremont's Leather Flower (*Clematis fremontii*)
		Umbrella Plant (*Eriogonum longifollium var. longifolium*)
		Stemless Evening Primrose (*Oenothera triloba*)
		Low Prickly Pear (*Opuntia macrorhiza*)
		Stenosiphon (*Stenosiphon linifolius*)

Landscapes, Communities and Species worthy of special consideration in this LTA Type include:		
		Ozark Spiderwort (*Tradescantia ozarkana*)
		A Venus' Looking Glass (*Triodanis lamprosperma*)
		Ozark Corn Salad (*Valerianella ozarkana*)
		Arkansas Yucca (*Yucca arkansana*)
		Eastern Collared Lizard (*Crotaphytus collaris collaris*)
		Greater Roadrunner (*Geococcyx californianus*)
		Painted Bunting (*Passerina ciris*)
	Caves	**Caney Mountain Cave Crayfish(*Orconectes stygocaneyi*)**
		Cave Salamander (*Eurycea lucifuga*)
		Grotto Salamander (*Typhlotriton spelaeus*)
		Gray Bat (*Myotis grisescens*)
	Rivers/ Streams (#) = Number captured within Aquatic COAs	**Belted Crayfish (*Orconectes harrisonii*)**
		Long-pincered Crayfish (*Orconectes longidigitus*)
		Meek's Crayfish (*Orconectes meeki*)
		St. Francis River Crayfish (*Orconectes quadruncus*)
		Williams' Crayfish (*Orconectes willamsi*)
		Ozark Chub (*Erimystax harryi*)
		Yoke Darter (*Etheostoma juliae*)
		Checkered Madtom (*Noturus flavater*)

OZARK PINE-OAK WOODLAND DISSECTED PLAINS LTAs



CHARACTERISTICS: Flat to moderately rolling divides in the southeastern Ozarks that are associated with the Roubidoux formation and low base soils (ultisols). These landscapes include pineries around Grandin, Potosi and Winona. Valleys are mainly broad with losing and intermittent headwater streams and creeks with gravel bed channels. Historically, this LTA type was covered in shortleaf pine and pine-oak woodland. Today, it is dominated by dense second growth oak and oak-pine forest with diminished pine and ground flora diversity. Sinkhole ponds are common. Outstanding opportunities for pine woodland restoration exist.



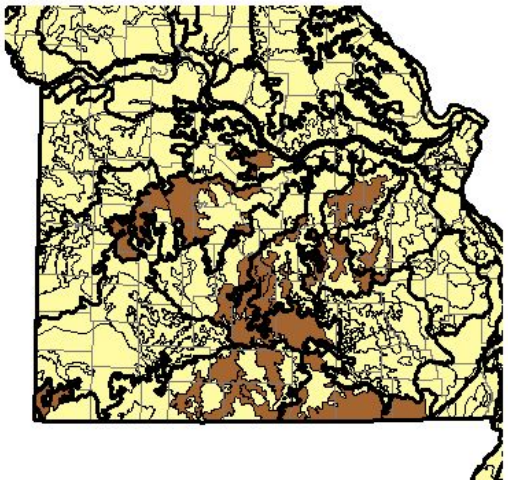
MANAGEMENT ISSUES AND OPPORTUNITIES:

- These landscapes encompass over 850,000 acres. Conservation lands make up over 275,000 acres (32% of the area), consequently providing outstanding opportunities for conserving these ecosystems at a landscape scale. Most of the conservation lands are on Mark Twain National Forest, over 40,000 acres are on MDC. Prominent conservation lands include Little Black, Mudpuppy, Birch Creek and portions of Sunklands, Peck Ranch, Rocky Creek and Logan Creek Conservation Areas (MDC).
- Many of the largest patches of existing shortleaf pine still exist on these landscapes and less so, on the adjacent Oak-Pine Hills.
- Much of the forested acreage on these landscapes is suffering oak decline. Management using timber harvest and prescribed fire to restore pine-oak woodlands is proving successful.
- Sinkhole ponds and their many rare species are concentrated in these LTAs. A substantial number of fens also occur.
- Protection of karst basins and headwater streams will ensure water quality downstream.
- Pine woodland restoration could supply products from thinning, as well as a long term supply of pine timber products. Potential native forage resources are also possible.
- Access to roads and towns offers opportunities for interpretation, picnic areas and short trails.

OZARK PINE-OAK WOODLAND DISSECTED PLAINS LTAs

Landscapes, Communities and Species worthy of special consideration in this LTA Type include:		
Landscapes	10,000+ acre Pine-Oak Woodland landscapes with Sinkhole Pond and Fen inclusions	
Natural Communities	Pine-Oak Chert and Sandstone Woodlands	
	Pine-oak and Mixed Oak Dry-mesic Chert and Sandstone Forest	
	Ozark Fen	
	Pond Shrub Swamp	
	Pond Marsh	
	Sinkhole Flatwoods	
Habitats		
Plants and Animals (**Bold** = Species of Conservation Concern. Other species are highly dependent on this system)	Woodland	**A Blazing Star (*Liatris scariosa var. nieuwlandii*)**
		Shrubby Sundrops (*Oenothera fruticosa ssp fruticosa*)
		Buck Moth (*Hemileuca maia*)
		Ringed Salamander (*Ambystoma annulatum*)
		Wood Frog (*Rana sylvatica*)
		Bachman's Sparrow (*Aimophila aestivalis*)
		Chuck-will's-widow (*Caprimulgus carolinensis*)
		Whip-poor-will (*Caprimulgus vociferus*)
		Pine Warbler (*Dendroica pinus*)
		Orchard Oriole (*Icterus spurius*)
		Great Crested Flycatcher (*Myiarchus crinitus*)
		Summer Tanager (*Piranga rubra*)
	Fens and Sinkhole Ponds	**Epiphytic Sedge (*Carex decomposita*)**
		Hine's Emerald (*Somatochlora hineana*)
		Gray Petaltail (*Tachopteryx thoreyi*)

OZARK OAK WOODLAND DISSECTED PLAINS AND HILLS LTAs



CHARACTERISTICS: Flat to moderately rolling drainage divides with up to 150 feet of local relief, and hillier lands in the more droughty upper Osage and Gasconade river basins. Historically, post oak and mixed oak woodland dominated these landscapes, with timber density increasing toward the deepest valleys. Intermittent headwater streams and creeks have gravel bed channels, but also small perennial rivers. Today, these landscapes are a near even mix of fescue pasture and dense second growth oak woodland. Substantial opportunities exist for managing a grassland-woodland mosaic.

MANAGEMENT ISSUES AND OPPORTUNITIES:

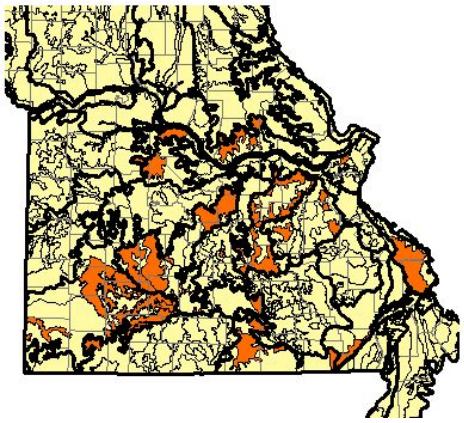
- These landscapes encompass over 3 million acres. Conservation lands make up over 350,000 acres (9% of the area). Prominent conservation lands include White Ranch, Gist Ranch, Drury-Mincy, Mule Shoe, Shannon Ranch, Big Buffalo Creek, Fourche Creek, Fuson, and a portion of Indian Trail Conservation Areas (MDC), Norfork Lake and Truman Reservoir lands (COE), substantial Mark Twain National Forest lands (USFS) occur in the Rolla, Potosi, Doniphan and Cassville Districts.
- While some of the largest patches of grassland in the Ozarks occur on these LTAs, they are mainly fescue pasture with limited diversity.
- Substantial acreages of these landscapes are currently forested, however, most is very dense second growth forest with a highly diminished ground flora. Management using thinning and prescribed fire in these landscapes has illustrated the resiliency of the oak woodland ecosystem. Pine plantations are relatively common on these landscapes; they are off site and of poor diversity.
- Glades are relatively common, and a substantial number of fens and sinkhole ponds occur.
- Problem exotic species include fescue, sericea lespedeza, spotted knapweed.
- Streams are impacted by riparian forest clearing, intensive livestock grazing and in-stream gravel mining.
- Savanna and woodland management can potentially supply short log timber products and native forage.
- Access to roads and towns offers opportunities for interpretation, picnic grounds and short trails. Excellent wildland hunting, fishing, camping and hiking opportunities also exist.
- Substantial development around Truman Lake is impacting native ecosystems and their management.

OZ OAK WOODLAND DISSECTED PLAINS AND HILLS LTAs

Landscapes, Communities and Species worthy of special consideration in this LTA Type include:		
Landscapes	2000+ acre Woodland Landscapes with Glade and Fen Inclusions	
Natural Communities	Mixed Oak-Hickory Dry-mesic Chert Forest	
	Post Oak and Mixed Oak Dry Chert and Sandstone Woodlands	
	White Oak-Black Oak Dry-mesic Chert and Sandstone Woodlands	
	Post Oak Flatwoods	
	Mixed Oak and White Oak Dry-mesic Chert and Sandstone Forest	
	Riverfront and Mixed Hardwood Mesic Bottomland Forests	
	Dolomite Glade	
	Sandstone Glade	
	Ozark Fen	
	Prairie Fen	
	Pond Shrub Swamp	
	Sinkhole Pond – Ozark	
	Caves	
Habitats		
Plants and Animals (**Bold** = Species of Conservation Concern. Other species are highly dependent on this system)	Forest	**Ringed Salamander (*Ambystoma annulatum*)**
		Four-toed Salamander (*Hemidactylium scutatum*)
	Woodland	Ozark Swallowtail (*Papilio joanae*)
		Chuck-will's-widow (*Caprimulgus carolinensis*)
		Whip-poor-will (*Caprimulgus vociferus*)
		Orchard Oriole (*Icterus spurius*)
		Great Crested Flycatcher (*Myiarchus crinitus*)
		Summer Tanager (*Piranga rubra*)
	Glades/ Cliffs	**French Mulberry (*Callicarpa americana*)**
		Gattinger Prairie-clover (*Dalea gattingeri*)
		Umbrella Plant (*Erigonum longifolium var. longifolium*)
		Geocarpon (*Geocarpon minimum*)
		A Rush (*Juncus validus*)
		Elliott Sida (*Sida elliottii*)

Landscapes, Communities and Species worthy of special consideration in this LTA Type include:		
	Fens and Sinkhole Ponds	**Queen of the Prairie (*Filipendula rubra*)**
		Virginia Sneezeweed (*Helenium virginicum*)
		Hall's Bulrush (*Schoenoplectus hallii*)
		Riddell's Goldenrod (*Solidago riddellii*)
		Gray Petaltail (*Tachopteryx thoreyi*)
	Caves	**Tumbling Creek Cavesnail (*Antrobia culveri*)**
		Cave Salamander (*Eurycea lucifuga*)
		Gray Bat (*Myotis grisescens*)
		Northern Myotis (*Myotis septentrionalis*)
		Indiana Bat (*Myotis sodalis*)

OZARK
OAK SAVANNA/WOODLAND DISSECTED PLAINS LTAs



CHARACTERISTICS: High, flat to moderately rolling landscapes most often on drainage divides throughout the Ozarks. Also includes the relatively shallow valleys and Low Hills LTAs in the more droughty western Ozarks. These landscapes occur mainly on somewhat shallow, droughty soils, with frequent fragipans. Historically, post oak and post oak-black oak savannas and woodlands with scattered prairie openings dominated. Some valleys may have more productive forest sites. Frequently, these landscapes include karst areas with numerous sinkholes. Streams are often intermittent in shallow valleys with gravel bed channels. Today, a mosaic of fescue pasture, scattered trees and dense second growth oak woodlots exists with abrupt transitions. Many roads and towns, and little public land occurs.

MANAGEMENT ISSUES AND OPPORTUNITIES:

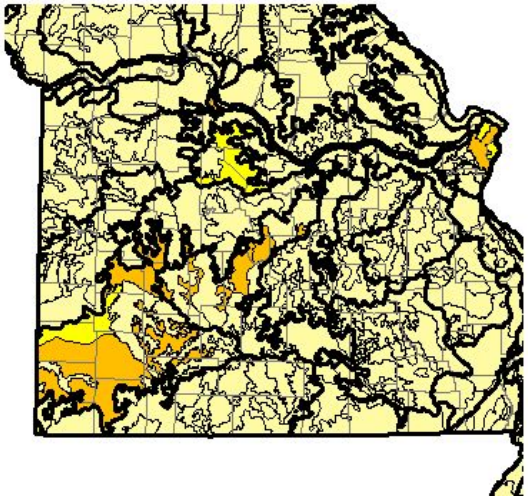
- These landscapes encompass over 4 million acres. Conservation lands make up 120,000 acres (3% of the area). Consequently, substantial conservation efforts may rely on private lands. Prominent conservation lands include Whetstone, White River Trace, Little Sauk and Fort Crowder Conservation Areas (MDC), Bennett Springs and Stockton State Parks (DNR), Stockton Reservoir (COE), Mark Twain National Forest (USFS), and Bennett Springs Savanna (TNC).
- Though mosaics of grass, scattered trees and dense woodlands are common, they are often degraded by heavy grazing and the absence of prescribed fire. Wildfire is a problem in some areas.
- Very few prairie, savanna or woodland communities remain. “Ozark Barrens” are among the most endangered ecosystems in the Ozarks.
- Prescribed fire has illustrated the restoration potential of the oak savanna and woodland systems.
- Some valleys, especially in the SE Ozarks may have productive forest sites.
- Other important habitats include prairie, sinkhole ponds, glades, caves, and globally unique chert glades.
- These LTAs form critical corridors between major drainages.
- Problem exotic species include fescue, sericea lespedeza, spotted knapweed, Autumn olive, and honeysuckle.
- Land use in sinkhole plains and headwater streams may impact water quality and habitat downstream.
- Grassland, savanna and woodland management can potentially supply native forage and short log timber products.
- Roads and towns offer opportunities for interpretation, picnic grounds and short trails; but a wide variety of recreational opportunities occur.

OZARK OAK SAVANNA/WOODLAND DISSECTED PLAINS LTAs

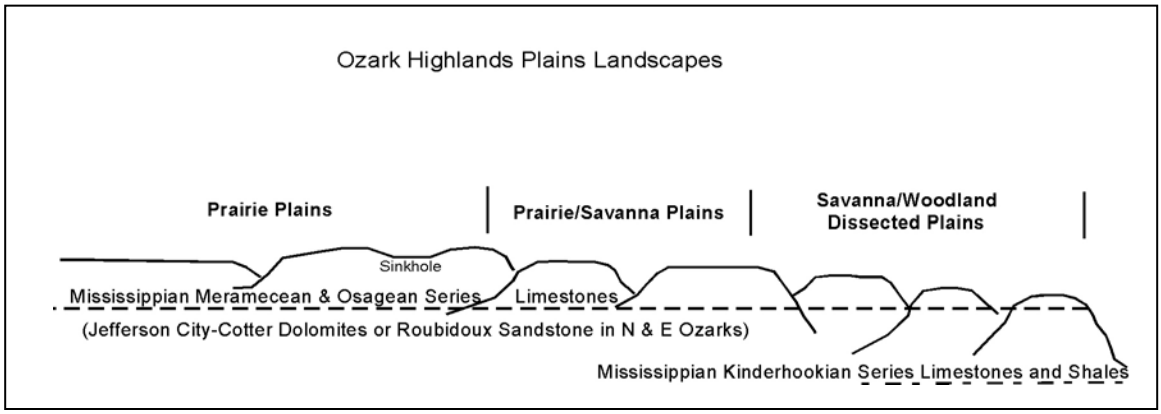
Landscapes, Communities and Species worthy of special consideration in this LTA Type include:		
Landscapes	2000+ acre Savanna/Woodland Complexes	
	ChertGlade/Woodland Complexes	
Natural Communities	Post Oak and Mixed Oak Chert Woodlands	
	Post Oak Flatwoods	
	Post Oak Chert Savanna	
	Mixed oak and White Oak Dry-mesic Chert Forest	
	Other Important Communities include: Dry-mesic Chert Prairie, Chert Glade, Limestone Glade, Sandstone Glade, Ozark fens, and Caves	
Habitats	Early successional grass/shrublands	
Plants and Animals (**Bold** = Species of Conservation Concern. Other species are highly dependent on this system)	Woodland	**Ozark Wake Robin (*Trillium pusillum var. ozarkanum*)**
		Ozark Swallowtail (*Papilio joanae*)
		Chuck-will's-widow (*Caprimulgus carolinensis*)
		Whip-poor-will (*Caprimulgus vociferus*)
		Orchard Oriole (*Icterus spurius*)
		Great Crested Flycatcher (*Myiarchus crinitus*)
		Summer Tanager (*Piranga rubra*)
	Savanna	Eastern Tiger Salamander (*Ambystoma tigrinum tigrinum*)
		Broad-headed Skink (*Eumeces laticeps*)
		Northern Fence Lizard (*Sceloporus undulatus*)
		Three-toed Box Turtle (*Terrapene carolina*)
		Northern Bobwhite (*Colinus virginianus*)
		Prairie Warbler (*Dendroica discolor*)
		Field Sparrow (*Spizella pusilla*)
		Brown Thrasher (*Toxostoma rufum*)
		Blue-winged Warbler (*Vermivora pinus*)
	Glades/ Cliffs	**Western Wallflower (*Erysimum capitatum var. capitatum*)**
		Geocarpon (*Geocarpon minimum*)
		Missouri Bladder-pod (*Lesquerella filiformis*)
		Thelesperma (*Thelesperma filifolium var. filifolium*)

Landscapes, Communities and Species worthy of special consideration in this LTA Type include:		
	Sinkhole Ponds and Seeps	**Virginia Sneezeweed (*Helenium virginicum*)**
		Pale Green Orchid (*Platanthera flava var. flava*)
		Halberd-leaved Tear Thumb (*Polygonum arifolium*)
	Caves	**Enigmatic Cavesnail (*Fontigens antroecetes*)**
		Bristly Cave Crayfish (*Cambarus setosus*)
		Ozark Cavefish (*Amblyopsis rosae*)
		Grotto Sculpin (*Cottus sp.*)
		Cave Salamander (*Eurycea lucifuga*)
		Gray Bat (*Myotis grisescens*)
		Indiana Bat (*Myotis sodalis*)

OZARK PRAIRIE PLAINS (yellow) PRAIRIE/SAVANNA DISSECTED PLAINS (orange) LTAS



CHARACTERISTICS: High, flat to gently rolling landscapes with less than 100 feet of local relief. These landscapes occur mainly in the western Ozarks where prairie was more prevalent, but also in the vicinity of St. Louis. They are often associated with karst areas. Historically, prairie dominated the highest, flattest areas and graded into post oak barrens and savanna. Some woodland and forest sites occur in deeper valleys. Intermittent headwater streams, as well as sinkhole basins were prevalent. Today, these landscapes are largely fescue pasture with small, isolated woodlots, except where urban development dominates. Substantial opportunity for grassland and savanna management exists.



MANAGEMENT ISSUES AND OPPORTUNITIES:

- These landscapes encompass over 3 million acres. Conservation lands make up 18,000 acres (less than 1% of the area). Consequently, private land programs may dominate land conservation efforts. Prominent conservation lands include Bois d' Arc, Talbot, Diamond Grove, Sloan, and Rinquelin Conservation Areas (MDC), Mount Vernon Prairie Natural Area (TNC), and Woods Prairie (Ozark Regional Land Trust).
- While some of the largest patches of grassland in the Ozarks occur on these LTAs, they are mainly fescue pasture with limited diversity.
- Very few prairie or savanna communities remain, making these ecosystems among the most endangered in the Ozarks. Management using prescribed fire in these landscapes has illustrated the resiliency of prairie and savanna systems.
- Limestone glades and prairies are largely confined to this part of the Ozarks.
- ***Limited woodland or forest management opportunities occur. Some deep soil pockets have forest potential. Walnut groves often productive.***
- Land use in sinkhole plains and headwater streams, especially intensive livestock grazing, confined animal feeding operations, and riparian clearing, may impact water quality here and downstream.
- Urbanization, especially St. Louis, Springfield and Joplin regions have heavy impacts.
- Grassland management can potentially supply native forage.
- Access to roads and towns offers opportunities for interpretation, picnic grounds and short trails; in addition to a wide variety of other activities.

OZARK PRAIRIE PLAINS (yellow) & Z10 PRAIRIE/SAVANNA DISSECTED PLAINS (orange) LTAs

Landscapes, Communities and Species worthy of special consideration in this LTA Type include:		
Landscapes	2000+ acre Prairie/Grassland Core in 10,000+ acre Grassland Landscapes	
	2000+ acre Prairie/Savanna Complexes	
Natural Communities	Post Oak Flatwoods	
	Post Oak Chert Savanna	
	Mixed Oak Limestone/Dolomite Savanna	
	Mixed oak and White Oak Chert Woodland and Forest	
	Dry Limestone/Dolomite Prairie	
	Dry-mesic Limestone/Dolomite Prairie	
	Dry-mesic Chert Prairie	
	Hardpan Prairie	
Habitats		
Plants and Animals (**Bold** = Species of Conservation Concern. Other species are highly dependent on this system)	Woodland	**Ozark Wake Robin (*Trillium pusillum var. ozarkanum*)**
	Savanna	**Eastern Tiger Salamander (*Ambystoma tigrinum*)**
		Broad-headed Skink (*Eumeces laticeps*)
		Northern Fence Lizard (*Sceloporus undulatus*)
		Three-toed Box Turtle (*Terrapene carolina*)
		Northern Bobwhite (*Colinus virginianus*)
		Prairie Warbler (*Dendroica discolor*)
		Field Sparrow (*Spizella pusilla*)
		Blue-winged Warbler (*Vermivora pinus*)
	Prairie	**Mead's Milkweed (*Asclepias meadii*)**
		Prairie Mole Cricket (*Gryllotalpa major*)
		Regal Fritillary (*Speyeria idalia*)
		Grassland Crayfish (*Procambarus gracilis*)
		Northern Crawfish Frog (*Rana areolata circulosa*)
		Bullsnake (*Pituophis catenifer sayi*)
		Ornate Box Turtle (*Terrapene ornata*)
		Henslow's Sparrow (*Ammodramus henslowii*)
		Grasshopper Sparrow (*Ammodramus savannarum*)
		Upland Sandpiper *(Bartramia longicauda*)
		Swainson's Hawk (*Buteo swainsoni*)
		Loggerhead Shrike (*Lanius ludovicianus*)
		Dickcissel (*Spiza americana*)

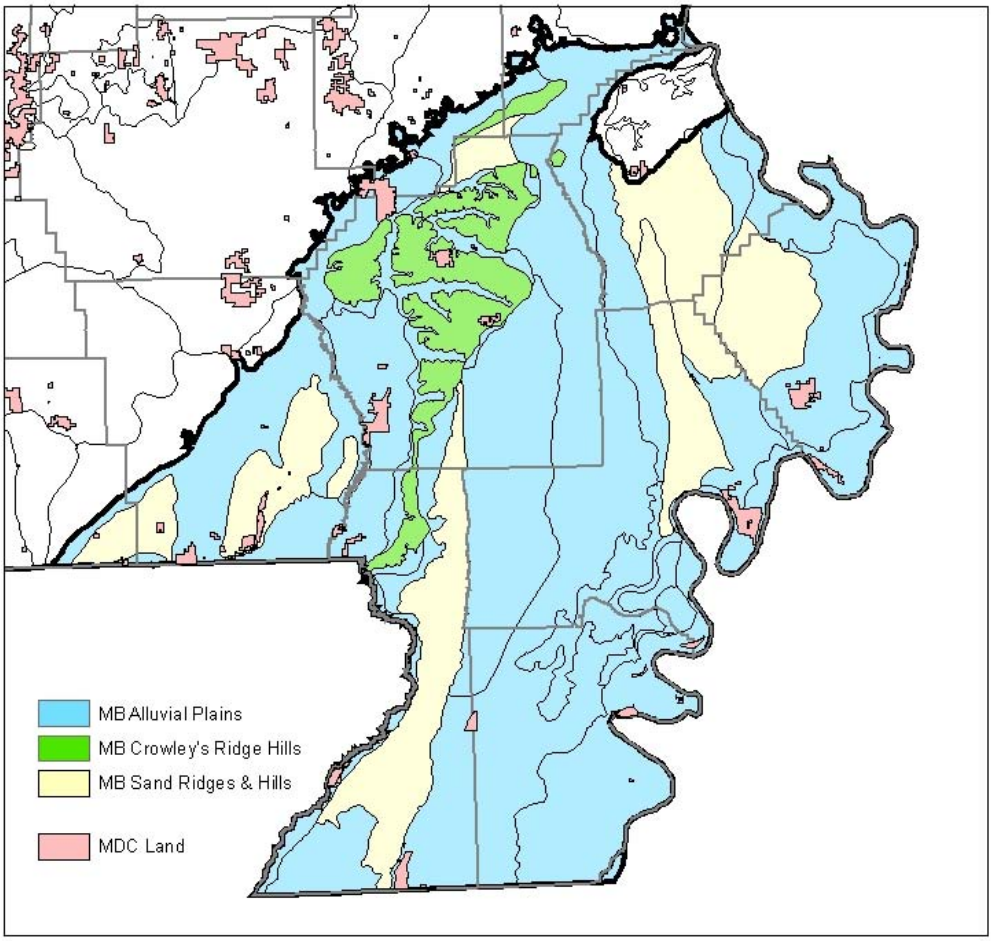
Landscapes, Communities and Species worthy of special consideration in this LTA Type include:		
		Eastern Meadowlark (*Sturnella magna*)
		Greater Prairie-chicken (*Tympanuchus cupido*)
		Scissor-tailed Flycatcher (*Tyrannus forficatus)*
		Bell's Vireo (*Vireo bellii*)
		Prairie Vole (*Microtus ochrogaster*)
		Hispid Cotton Rat (*Sigmodon hispidus*)
		Pinnate Dogshade (*Limnosciadium pinnatum*)
		Yellow Mud Turtle (*Kinosternon flavescens flavescens*)
	Caves	**Bristly Cave Crayfish (*Cambarus setosus*)**
		Ozark Cavefish (*Amblyopsis rosae*)
		Grotto Salamander (*Typhlotriton spelaeus*)
		Gray Bat (*Myotis grisescens*)
		Indiana Bat (*Myotis sodalis*)

MB MISSISSIPPI RIVER ALLUVIAL BASIN SECTION

The Mississippi River Alluvial Basin Section extends from southeastern Missouri southward down the broad Mississippi River alluvial plain to the Gulf of Mexico. It includes a complex array of alluvial surfaces formed during the long evolution of the drainage system since the close of the Tertiary Period. The section in Missouri is the northernmost location for some subtropical species and the westernmost location for some eastern species. Most of the section was formerly poorly drained. In the twentieth century extensive hydrological engineering for land drainage and flood protection has converted virtually all of the alluvial plain surface to cropland.

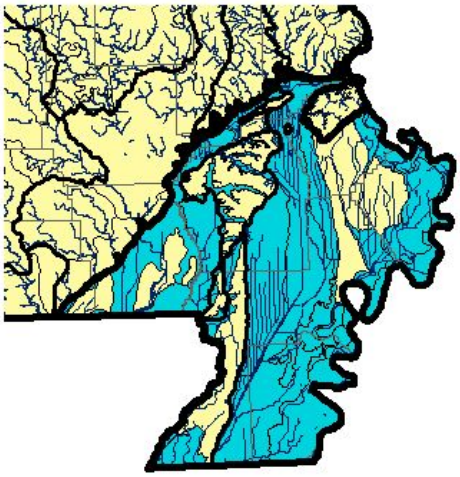
The section within Missouri is subdivided into three Landtype Association Types: Alluvial Plains, Crowley's Ridge, and Sand Plains, Hills and Ridges.

The woodland and forest resources of these landscapes are isolated in relatively small remnants. However, they contain examples of natural communities and species confined to this part of the state. Restoration opportunities in the vicinity of existing remnants may help expand and sustain the remaining resources.

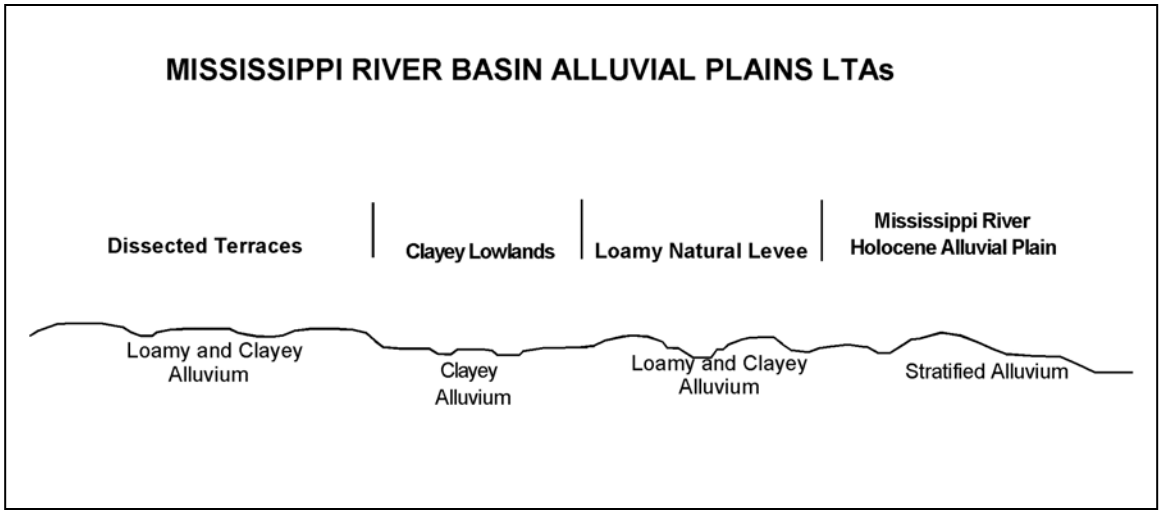


Mississippi Alluvial Basin LTA Types and MDC Lands

M1 MISSISSIPPI ALLUVIAL BASIN ALLUVIAL PLAINS LTAs



CHARACTERISTICS: The low, flat alluvial plains of the Bootheel, ranging from the lowest clayey bottoms, through slightly elevated silty terraces, to loamy textured natural levees and floodplains. This LTA type includes all landscapes in the bootheel except for Crowley's Ridge and the sand plains and terraces. Historically, these LTAs consisted of swamps, wet bottomland forests, mixed hardwood bottomland forests, riverfront forests and flatwoods with widely meandering, low gradient streams. Today, over 95% has been cleared for agriculture; most streams converted to or replaced by parallel ditches. There is some opportunity to build on remnant patches of native vegetation and current conservation ownership.



MANAGEMENT ISSUES AND OPPORTUNITIES:

- Size: 1.9 million acres. Conservation lands: 56,000 acres (3%); private land programs may dominate land conservation efforts such as WRP. Most conservation lands are owned by MDC; USFWS owns over 19,000 acres at Mingo NWR; Big Oak Tree State Park (DNR) encompasses over 1,100 acres. Other prominent conservation lands include Coon Island, Duck Creek, Otter Slough, Ten Mile Pond, Seven Island, Wilhelmina, Big Cane, Hornersville Swamp, Girvin, Black Island, Donaldson Point , and Dark Cypress Conservation Areas (MDC).
- The dynamic nature of the river and floodplain ecosystems has been largely harnessed by an extensive network of drainage ditches and levees. Land leveling is also common. Hydrology and water quality are severely altered.
- Remnants of all forested natural communities are rare; however, opportunities exist to build large patches of native ecosystems around existing remnants and conservation lands. Restoration efforts should match forest composition to appropriate fluvial landforms and altered hydrology.
- Wildlife friendly agricultural practices could provide important wildlife habitat and improve stream quality. The Wetland Reserve Program (WRP) is an important tool for wetland restoration efforts.
- Few streams exhibit natural integrity; stream habitats and water quality are degraded by channelization, riparian clearing, irragation and agricultural runoff (sediment, pesticides, herbicides, and fertilizers).
- Bottomland forest restoration could supply products from thinning and harvest activities, often on exceptionally productive land. Waterfowl and other hunting opportunities may also prove economically valuable and promote conservation activities.
- Interpretation and promotion of existing natural features can garner support for alternative conservation measures.

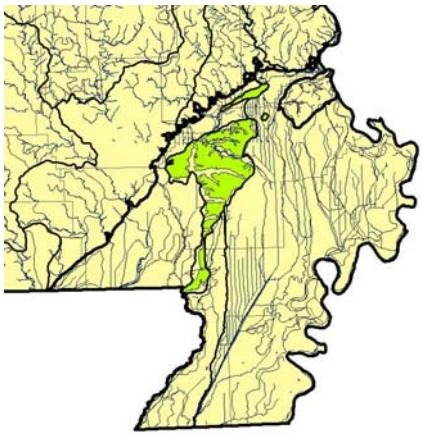
MISSISSIPPI ALLUVIAL BASIN ALLUVIAL PLAINS LTAs

Landscapes, Communities and Species worthy of special consideration in this LTA Type include:		
Landscapes	500+ acres of Riverfront Bottomland Forest and Swamp/Mixed Bottomland Hardwood Complexes	
Natural Communities	Riverfront Forest	
	Wet Bottomland Forest	
	Wet-Mesic Bottomland Forest	
	Bottomland Flatwoods	
	Freshwater Marsh	
	Shrub Swamp	
	Swamp	
	Oxbows and Sloughs (SE Lowlands)	
	Sandbar/Mudflat	
Habitats	Ephemeral Pools	
	Cane Breaks, Moist Soil	
Plants and Animals (**Bold** = Species of Conservation Concern. Other species are highly dependent on this system)	Forest	**A Sedge (*Carex abscondita*)**
		Reniform Sedge (*Carex reniformis*)
		A Gourd (*Cayaponia grandifolia*)
		Parsley Haw (*Crataegus marshallii*)
		Finger Dog-shade (*Cynosciadium digitatum*)
		Blunt Mountain Mint (*Pycnanthemum muticum*)
		Nuttall's Oak (*Quercus texana*)
		Trepocarpus (*Trepocarpus aethusae*)
		Cedar Elm (*Ulmus crassifolia*)
		Weak Nettle (*Urtica chamaedryoides*)
		Mole Salamander (*Ambystoma talpoideum*)
		Small-mouthed Salamander (*Ambystoma texanum*)
		Upland Chorus Frog (*Pseudacris feriarum*)
		Mississippi Kite (*Ictinia mississippiensis*)
		Swainson's Warbler (*Limnothlypis swainsonii*)
		Golden Mouse (*Ochrotomys nuttalli*)
		Cotton Mouse (*Peromyscus gossypinus*)
		Swamp Rabbit (*Sylvilagus aquaticus*)
	Wetlands	**Purple False Foxglove (*Agalinis purpurea*)**
		Triangular Sedge (*Carex triangularis*)
		Swamp Loosestrife (*Decodon verticillatus*)
		A Water Willow (*Justicia ovata*)
		Corkwood (*Leitneria floridana*)

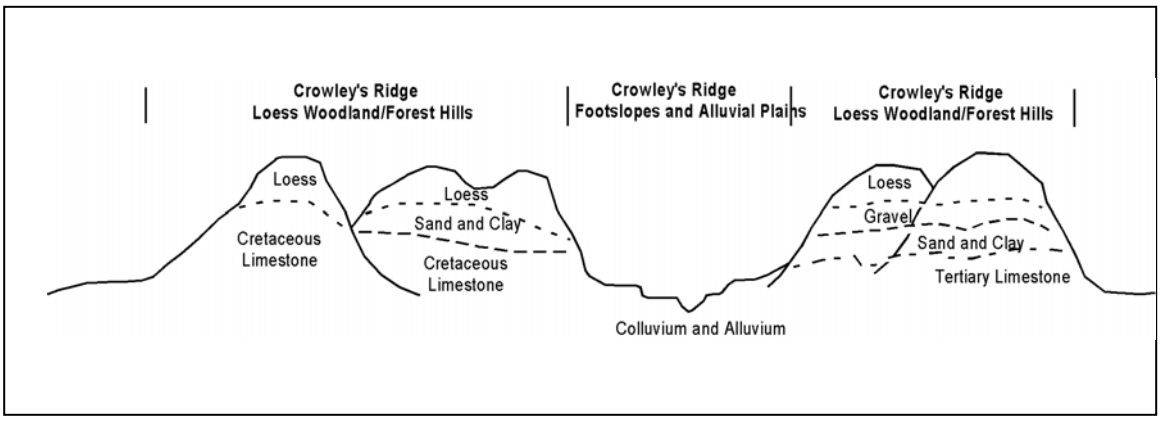
Landscapes, Communities and Species worthy of special consideration in this LTA Type include:		
		Pinnate Dogshade (*Limnosciadium pinnatum*)
		Pondberry (*Lindera melissifolium*)
		Primrose Willow (*Ludwigia leptocarpa*)
		Arrow Arum (*Peltandra virginica*)
		Bald Cypress Katydid (*Inscudderia taxodii*)
		Hoosier Grasshopper (*Proxya hoosieri*)
		Pirate Perch (*Aphredoderus sayaus*)
		Banded Pygmy Sunfish (*Elassoma zonatum*)
		Swamp Darter (*Etheostoma fusiforme*)
		Starhead Topminnow (*Fundulus dispar*)
		Bantam Sunfish (*Lepomis symmetricus*)
		Pugnose Minnow (*Opsopoedus emillae*)
		Three-toed Amphiuma (*Amphiuma tridactylum*)
		Green Treefrog (*Hyla cinerea*)
		Southern Painted Turtle (*Chrysemys picta dorsalis*)
		Western Chicken Turtle (*Deirochelys reticularia miaria*)
		Western Mud Snake (*Francia abacura reinwardtii*)
		Mississippi Map Turtle (*Graptemys pseudogeographica kohnii*)
		Broad-banded Water Snake (*Nerodia fasciata confluens*)
		American Bittern (*Botaurus lentiginosus*)
		Black Tern (*Chlidonias niger*)
		Little Blue Heron (*Egretta caerulea*)
		Snowy Egret (*Egretta thula*)
		Least Bittern (*Ixobrychus exilis*)
		Black-crowned Night Heron (*Nycticorax nycticorax*)
		Sora (*Porzana carolina*)
		King Rail (*Rallus elegans*)
		Virginia Rail (*Rallus limicola*)
		Interior Least Tern (*Sterna antillarum athalassos*)
		Rice Rat (*Oryzomys palustris*)
	Rivers/ Streams	**American Frogbit (*Limnobium spongia*)**
		Flat Floater (*Anodonta suborbiculata*)
		Bankclimber (*Plectomerus dombeyanus*)
		Wartyback (*Quadrula nodulata*)
		Texas Lilliput (*Toxolasma texasiensis*)

Landscapes, Communities and Species worthy of special consideration in this LTA Type include:		
		Shield Crayfish (*Faxonella clypeata*)
		Freshwater Shrimp (*Macrobrachium ohione*)
		Shrimp Crayfish (*Orconectes lancifer*)
		Brown Bullhead (*Ameiurus nebulosus*)
		Western Sand Darter (*Ammocrypta clara*)
		Flier (*Centrarchus macropterus*)
		Lake Chubsucker (*Erimyzon sucetta*)
		Mud Darter (*Etheostoma asprigene*)
		Bluntnose Darter (*Etheostoma chlorosomum*)
		Harlequin Darter (*Etheostoma histrio*)
		Cypress Darter (*Etheostoma proeliare*)
		Scaly Sand Darter (*Etheostoma vivax*)
		Cypress Minnow (*Hybognathus hayi*)
		Dollar Sunfish (*Lepomis marginatus*)
		Taillight Shiner (*Notropis maculatus*)
		Alligator Snapping Turtle (*Macrochelys temminckii*)

MISSISSIPPI ALLUVIAL BASIN
CROWLEY'S RIDGE LOESS WOODLAND/FOREST HILLS LTA



CHARACTERISTICS: An elevated and prominent loess covered ridge extending from the northern Bootheel south into Arkansas. The ridge is mainly former floodplain with a mixture of Quaternary sand, gravel, silt and bedrock substrates that has been isolated by shifts in the path of the Mississippi River. The Benton Hills to the east are included within the Ozarks. Historically, this landscape was timbered in a variety of woodland and forest communities, several unique to this area. Unusual acid seep communities occupied some valleys. Today, the ridge is partially timbered with frequent pasture. Forest, woodland and seep communities are worthy of conservation.



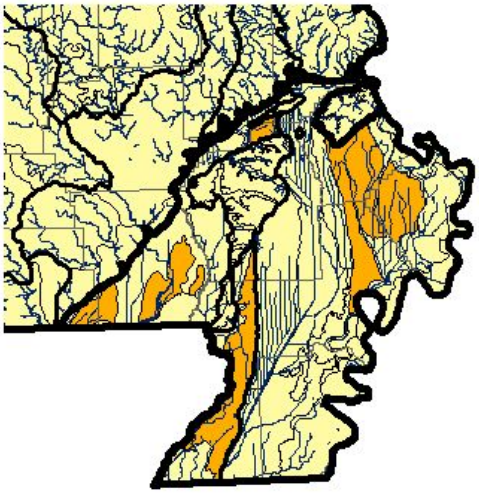
MANAGEMENT ISSUES AND OPPORTUNITIES:

- Size: 150,000 acres. Conservation lands: 3,700 acres (2%). Most conservation lands are owned by MDC, including Crowley's Ridge and Holly Ridge Conservation Areas.
- Most woodland and forest communities have been cleared, but several isolated patches remain. Efforts at reforestation, especially adjacent existing forest would be beneficial.
- Seep communities support numerous rare species and are threatened by gravel mining.
- Wildlife friendly agricultural practices could provide important wildlife habitat and improve stream quality.
- Stream habitats and water quality are degraded by channelization, riparian clearing and agricultural runoff (sediment, pesticides, herbicides and fertilizers).
- High value hardwood timber products may help support the restoration of forest and woodland communities.
- Interpretation and promotion of existing natural features can serve to garner support for alternative conservation measures.

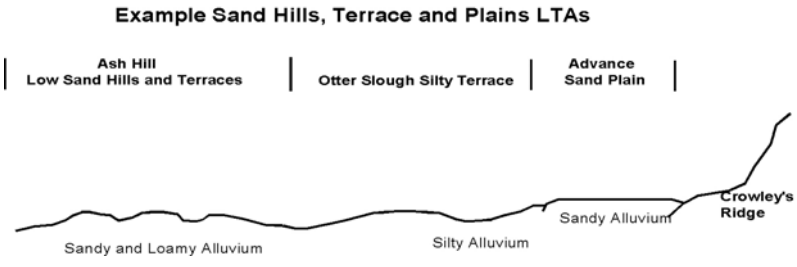
MISSISSIPPI ALLUVIAL BASIN
CROWLEY'S RIDGE LOESS WOODLAND/FOREST HILLS LTA

Landscapes, Communities and Species worthy of special consideration in this LTA Type include:		
Landscapes	500+ acres of Woodland and Forest	
Natural Communities	Mixed Oak-Hickory Dry-Mesic Sand and Loess Forest	
	Mixed Hardwood Mesic Sand and Loess Forest (Beech, Sugar Maple, Sweetgum)	
	Post Oak Dry Sand Woodland	
	Mixed Oak Dry-Mesic Sand and Loess Woodland	
	Acid Seep	
Habitats		
Plants and Animals (**Bold** = Species of Conservation Concern. Other species are highly dependent on this system)	Forest	**Beech Drops (*Epifagus virginiana*)**
		American Beech (*Fagus grandifolia*)
		American Holly (*Ilex opaca*)
		Spotted Salamander (*Ambystoma maculatum*)
		Marbled Salamander (*Ambystoma opacum*)
		Prothonotary Warbler (*Protonotaria citrea*)
	Woodland	**Fleabane (*Conyza canadensis var. pusilla*)**
		Plukenet's Cyperus (*Cyperus plukenetii*)
		Jointweed (*Polygonella americana*)
		Blue Curls (*Trichostema setaceum*)
		Velvety Tick Trefoil (*Desmodium viridiflorum*)
		Timber Rattlesnake (*Crotalus horridus*)
	Acid Seeps	**Black Chokeberry (*Aronia melanocarpa*)**
		Screwstem (*Bartonia paniculata*)
		White-edge Sedge (*Carex debilis var. debilis*)
		Large Whorled Pagonia (Isotria verticillata)
		Green Wood Orchid (Platanthera clavellata)
		Cranefly Orchid (Tipularia discolor)
		A Sedge (Carex atlantica)
	Rivers/ Streams	**Goldstripe Darter (*Etheostoma parvipinne*)**

MISSISSIPPI ALLUVIAL BASIN SAND RIDGES, PLAINS AND HILLS LTAs



CHARACTERISTICS: Slightly elevated terraces and former alluvial fans with loamy and sandy substrates, often excessively drained. Includes the somewhat prominent flat ridges associated with Sikeston, Kennett and Malden, as well as dissected sand plains in Scott County and dune-swale areas in Ripley County. Historically, sand prairie and savanna dominated with numerous unique species. Also, these LTA types included unusual swale habitats. Today, most of these lands are cleared for agriculture and only a very few small remnants remain.



MANAGEMENT ISSUES AND OPPORTUNITIES:

- Size: 500,000 acres. Conservation lands: 4,100 acres (<1%); consequently, private land programs may dominate land conservation efforts. Most conservation lands are owned by MDC, including Corkwood, Sand Ponds, Sand Prairie, Hemingway and a portion of Coon Island Conservation Areas.
- While most sand communities and species in the bootheel are confined to these landscapes, remnants of all natural communities are rare. There are currently very limited sand woodland, savanna or prairie ecosystems in conservation ownership.
- Wildlife friendly agricultural practices could provide important wildlife habitat and improve stream quality.
- Stream habitats and water quality are degraded by channelization, riparian clearing and agricultural practices (sedimentation, pesticides, herbicides and fertilizers).
- Irragated cottonwood plantations are an alternative land use with some benefits.
- Interpretation and promotion of existing natural features can serve to garner support for alternative conservation measures.

MISSISSIPPI ALLUVIAL BASIN SAND RIDGES, PLAINS AND HILLS LTAs

Landscapes, Communities and Species worthy of special consideration in this LTA Type include:		
Landscapes	200+ acre patches of Dune-Swale Forested Wetlands, and Sand Prairie and Savanna Ridges	
Natural Communities	Mixed Oak-Hickory Dry-mesic Sand Forest	
	Wet Bottomland Forest	
	Wet-mesic Bottomland Forest	
	Post Oak Dry Sand Woodland	
	Mixed Oak Dry-mesic Sand Woodland	
	Sand Savanna	
	Sand Prairie	
Habitats	Dune Swale Ponds (Ephemeral Pools)	
Plants and Animals (**Bold** = Species of Conservation Concern)	Forest	**Slender Spike Grass (*Chasmanthium laxum ssp. laxum*)**
		Water Oak (*Quercus nigra*)
	Savanna	**Woolyleaf Three-awn (*Aristida lanosa*)**
		Sand Hickory (*Carya pallida*)
		Baldwin's Cyperus (*Cyperus croceus*)
		Pitchfork Paspalum (*Paspalum bifidum*)
		Juniper-leaf (*Polypremum procumbens*)
	Prairie	**Curly Three-awn (*Aristida desmantha*)**
		Geyer's Spurge (*Chamaesyce geyeri*)
		A Corydalis (*Corydalis micrantha ssp. australis*)
		Narrowleaf Rushfoil (*Crotonopsis linearis*)
		An Umbrella Sedge (*Cyperus grayoides*)
		Many-spiked Cyperus (*Cyperus polystachyos var. texensis*)
		Umbrella Sedge (*Cyperus retroflexus*)
		Pineland Tick Trefoil (*Desmodium strictum*)
		Creeping St. John's-wort (*Hypericum adpressum*)
		Warty Panicgrass (*Panicum verrucosum*)
		Double-formed Snoutbean (*Rhynchosia difformis*)
		Rough-fruit Spermolepis (*Spermolepis divaricata*)
		A Stylisma (*Stylisma pickeringii var. pattersonii*)
		Eastern Spadefoot (*Scaphiopus holbrookii holbrookii*)
		Dusky Hognose Snake (*Heterodon nasicus gloydi*)

Landscapes, Communities and Species worthy of special consideration in this LTA Type include:		
	Wetlands (mainly swale ponds)	**A Spike Rush (*Eleocharis atropurpurea*)**
		Clustered Bluets (*Hedyotis uniflora*)
		Corkwood (*Leitneria floridana*)
		Pondberry (*Lindera melissifolium*)
		American Cupscale (*Sacciolepis striata*)
		Hall's Bulrush (*Schoenoplectus hallii*)
		Eastern Blue-eyed Grass (*Sisyrinchium atlanticum*)
		Snowy Egret (*Egretta thula*)
		Illinois Chorus Frog (*Pseudacris streckeri illinoensis*)